YunHorn Technology
Shenzhen Bay, China

Smart Washroom Management System

SmarToilets ®

Shenzhen Yunhorn Technology Co., Ltd.

Value Proposition, A Best Practice of Smart City over IoT

- Manage manpower, time cards
- Schedule equipment repairs, consumable inventories and replenishments
- Timely Alerts cleaners for specific restrooms with clear service rules and frequencies.

- Offer clean and sterile restroom services through visual display of public restroom locations, their clean indexes, usage statistics and direction/route to the restrooms on the map

- Provide data to measure quality of services.
- Quantify consumable management, energy consumption with benchmarking towards high maintenance quality

Business Architecture

Air Quality Monitoring | Energy Consumption | Sewage Discharge Monitoring | Consumable Management | Health & Safety | Reactive Maintenance | Garbage Classification

Maintenance Quality | Occupancy Monitoring | Throughput Analyses | Video Monitoring | Central Dashboard | Awarelessness Attendance | Garbage Management

APPLICATION LAYER

Hygiene Monitor | Toilet Information Display | Inspection Management | Consumable Monitoring | Cleaning Schedule & Attendance

Air Monitor | Restroom Cleanliness Display | Maintenance Management | Toilet Paper Level Alert | Consumable usage by person

Energy/Water U sage Monitor | Toilet Occupancy Detection | Quality & Complaint Management | Hand Soap Level Alert | Visual Visitor Flow Analyses

PLATFORM LAYER

GIS | Message Distribution | Distributed Computing | AI Engine

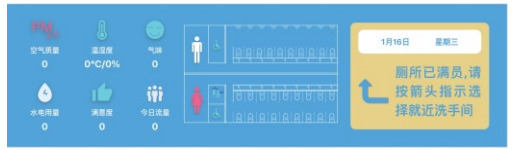
Message Queue | Certificate Management | **IOT Platform** | Distributed Storage | Big Data

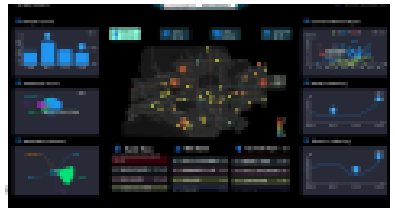
EDGE-AI LAYER

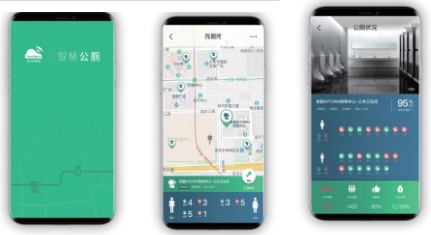
Edge Intelligence, fuzzy logic control, IoT Gateway

SENSOR LAYER

Odor/Smoke Air sensors | Electr. meter | Water meter | Reed switch & sensor | Occupanc Light | Sewage Meter | Garbag Sensor | Paper Level | Soap Level | Video Analyses | People Counter | RF ID Attendanc | Facial Recognition Attendance | Smart Equip Linkage





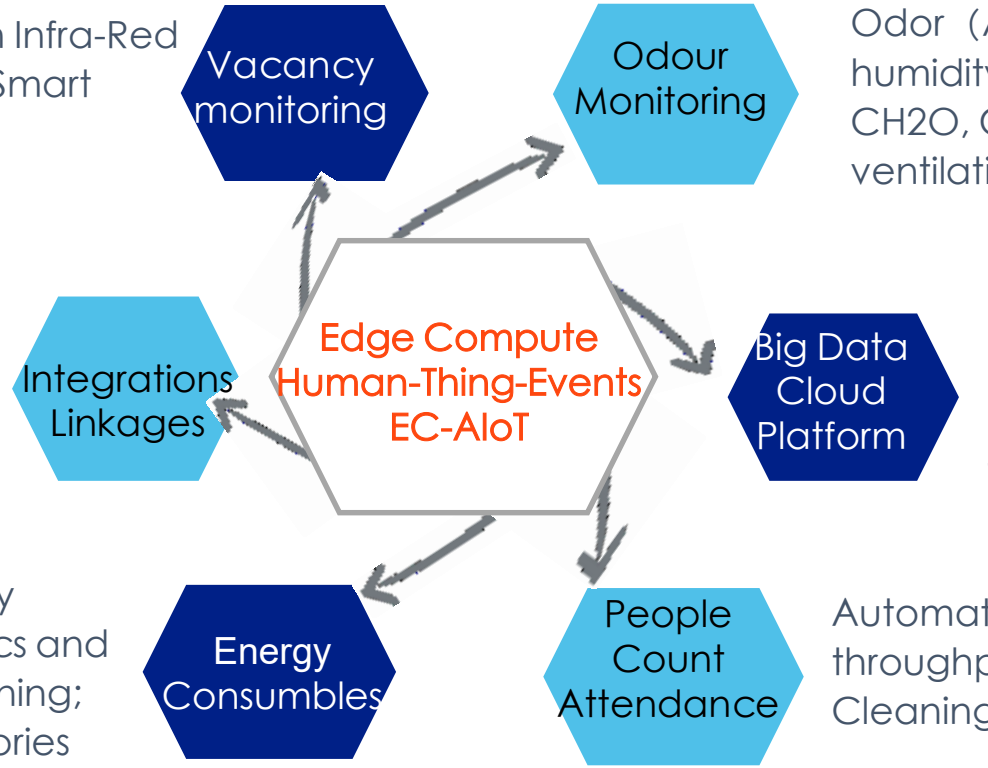


Functionalities, Driven By EC-AIoT & Big Data

Monitor vacancy with Infra-Red Presense Sensor and Smart Reed Switch.

Odor（Ammonia NH3, hydrothion H2S、humidity and temperature、 TVOC、PM2.5、CH2O, CO2) Integration with BMS (HVAC, ventilation)

Integration with other smart devices for multiple system orchestration



Operations management, aggregation, storage, analyses, user and integration interfaces through cloud big data platform

Water and electricity consumption statistics and exception early warning; Consumable inventories

Automatic attendance, people throughput statistics and Cleaning Employee scheduling

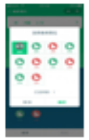
SmarToilets ® System Architecture

Data Warehouse
Backoffice Admin

Business Intelligent
Big Data

IoT Cloud

Restroom
Locator



Where-to-Pee
Mobile App

Maintenance
Work Order

Tri-Double Panel

Edge-Compute Gateway

Guidance Panel, InfoPub Dashboard
Large Display for Toilet Directory

Occupation
Detection

Maggic Mirror
Evaluative Feedback

Smoking
Detection

People
Counting

Paper/Soap
Detection

waste bin
Fill-Level

BGM
Alert Link

Reed Switch

Indication
Lights

Odour &
Air Quality

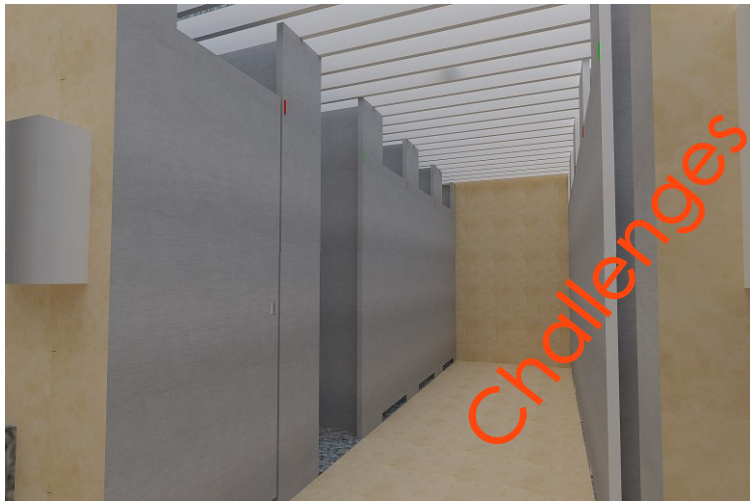
Awarelessness
Attendance

Water
Electric Meter

waste bin
Fill-level

Smart-Linkage

Public Washroom Cleaning management Solution



Quality Control & Monitoring
It is not feasible to periodically and physically monitor the cleanliness of the facility by FM supervisors. Lack of means to understand user perception of service quality.

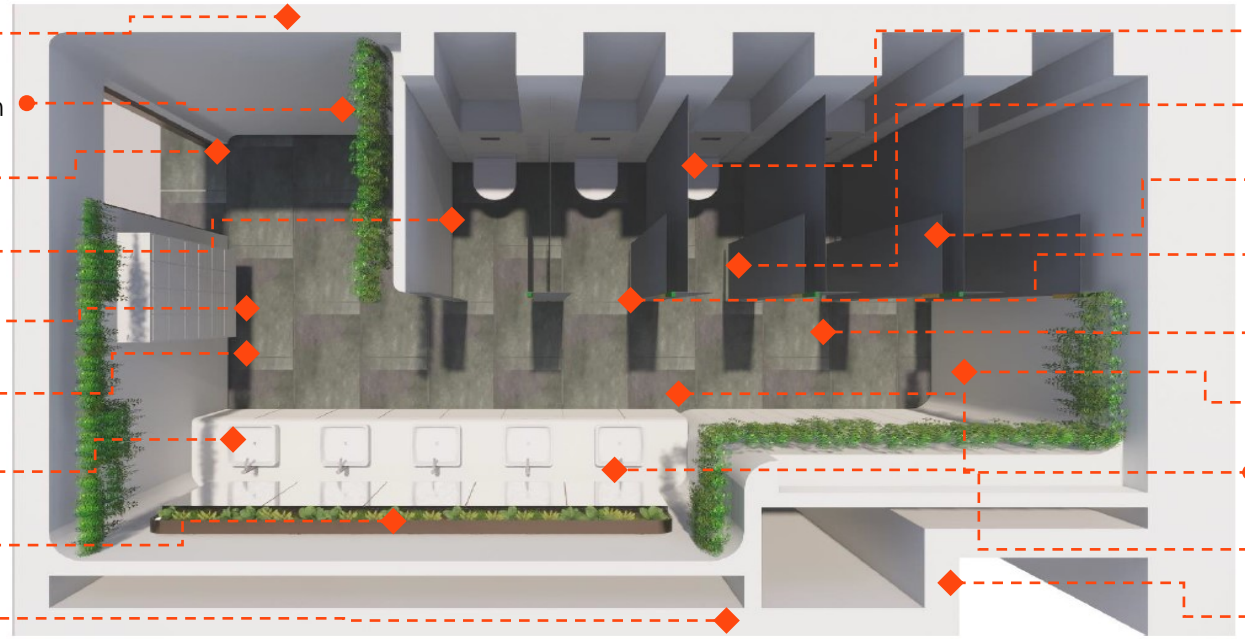
Punch Card or Task Recording
Paper based task recording or punch card leads to localized information, not easily accessible to cleaning supervisors and facility managers.

Standardize Cleanliness
"Clean" is a very subjective quantity. So it's hard to achieve expected cleaning standards with changing cleaning companies and cleaners.

Manpower Wastage
Toilet usage pattern varies with time-of-use and type-of-day. Hence, scheduled or even fixed monitoring wastes manpower.

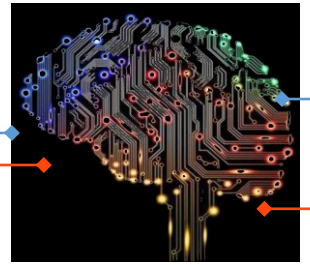
SmarToilets® Our Public Washroom Cleaning management solution provides a Next-Generation approach to toilet cleaning, with real-time monitoring of toilet facilities via different kind of sensors embedded around the toilet. Can also Provide useful customer feedback, monitoring everything from Air quality, Wetness levels, Roll Paper Dispenser, Soap Dispenser to how many times the toilet has been used,.

The system uses AI-assisted processes to evaluate and rate toilet cleanliness, then trigger alert to cleaners of issues, so they can be resolved quickly and efficiently without delay. Using ML &AI technology, the collected data allows the AI to learn the usage patterns of the facility and based on this, propose manpower requirements, required consumables inventories, to optimize its management and make dramatic time and cost savings, while improving the overall customer experience.



Sensor
Many kinds of, such as Odour Level Sensor, Temp, Humidity, comsumable dispensers

Cleaner Schedule Apps
Auto attendence system, tickets logs/schedule, alerts, workflow management



Cleaning Service Dashboard
Cleaning quality, real-time monitoring,ticket logging, event driven

RESO owner Dashboard
Sensor Data based, user feedback, workflow and evaluation report

AI-assisted-Cleaning Service Supervisor

Insights across multiple restroom with sensor data, usage pattern, coherent processing, smart scheduling

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