TECH OFFER

Multi-Functional Autonomous Facility Management Robot

KEY INFORMATION

TECHNOLOGY CATEGORY:
Environment, Clean Air & Water - Sensor, Network, Monitoring & Quality Control Systems
Green Building - Sensor, Network, Building Control & Optimisation
Infocomm - Robotics & Automation
Infocomm - Ambient Intelligence & Context-Aware Computing

TECHNOLOGY READINESS LEVEL (TRL): TRL8
COUNTRY: SINGAPORE
ID NUMBER: TO175342

OVERVIEW

The adoption of multi-functional autonomous robots is steadily increasing to support and enhance operational efficiency in the facilities management sector. This technology presents a robot integrated with advanced sensor systems, artificial intelligence (AI), and autonomous mobility to perform multiple tasks. As a digital concierge, the robot provides enhanced visitor experience with seamless 2-way communication and an integrated touchscreen to connect with site duty personnel. The same screen can double up as an announcement board for advertisements and alerts, thereby extending a virtual front-desk capability effectively. In the security domain, this robot conducts autonomous patrols with real-time video surveillance and A.I.-based anomaly

detection. The security head is embedded with a "brain" to perform on-edge computing to detect security-related used cases, significantly improving safety and accuracy in complex indoor environments. For cleaning, the robot can detect over 30 types of waste with 99% accuracy. Its self-adaptive cleaning system adjusts to floor type and debris volume, while a verification mechanism ensures more effective spot-cleaning compared to conventional single-pass robots.

These Multi-Functional Autonomous Facility Management Robot can yield significant operational savings, increase patrol frequency and shorten response time to incidents. This technology offers a software that features plug-and-play solutions that be customised to specific SOPs and needs. The technology owner is looking for collaborators, such as building owners and integrated facility management companies, with use cases to test-bed AI models. Examples include but not limited to identification of suspicious baggage, illegal parking or stray supermarket trolleys.

TECHNOLOGY FEATURES & SPECIFICATIONS

The robot combines autonomous navigation with real-time AI processing. Its modular design allows for easy customisation based on operational needs. Key components include:

- Sensor suite featuring 32-beam 3D LiDAR, ultrasonic sensors & cameras for obstacle detection or environmental mapping
- AI-powered modules for object/person detection, thermal imaging, and anomaly alert
- Cloud-based dashboard for task assignment, remote monitoring, and analytics
- Interchangeable task modules for cleaning (e.g., vacuum/sweeper), security patrolling, and data capture
- Detect over 30 types of waste with 99% accuracy, with cleaning efficiency reaches up to 15,550 m^2/hr
- Customisable module to fit specific applications

POTENTIAL APPLICATIONS

This multi-functional robotic platform is ideally suited for deployment in environments that require a combination of cleanliness, security, and user interaction, particularly where operational efficiency and manpower optimization are key priorities. Industries and settings include:

- **Commercial buildings:** Automates cleaning, performs security patrols during and after hours, and assists visitors
- **Healthcare facilities:** Maintains hygiene, monitors for safety risks, and provides non-contact concierge functions
- **Transportation hubs (airports, train stations):** Enhances public safety and facility cleanliness at scale
- **Retail complexes and malls:** Supports shopper engagement, provides sanitation services, and detects anomalies
- **Educational institutions and campuses:** Ensures safe, clean, and welcoming environments
- **Hospitality and mixed-use developments:** Offers 24/7 concierge support, patrolling, and environment upkeep

MARKET TRENDS & OPPORTUNITIES

The global service robotics market is projected to grow by a CAGR of 30.25%, or $90.4 billion, from 2024 to 2028. This rapid growth will be driven by the continuing integration of advanced technologies such as IoT, A.I., and natural language processing into service robots. Technological advancements in machine learning, adaptive computing, and vision systems will also make service robots increasingly suitable for commercial tasks.

UNIQUE VALUE PROPOSITION

This autonomous multi-functional robot offers a comprehensive upgrade over current facility management solutions by integrating various functions in domains such as cleaning, security, and concierge into a single, intelligent body.

This all-in-one solution delivers:

- Operational cost reduction through task consolidation across different functions, potentially cut cleaning and security manpower cost by 60-70%
- Faster response from sensing to action with integrated digital concierge, dashboard monitoring and real-time alerts
- Enhanced safety via advanced 3D spatial awareness
- Improved service quality without added manpower

By unifying execution and intelligence across multiple domains, the robot transforms traditional building operations into efficient, autonomous workflows, bridging the gap between insight and action, delivering a more responsive, self-sufficient, and cost-effective solution for modern facility operations.