Problem Statement: Integrated Autonomous Robotic Hard Floor Scrubber with Surveillance Features

Desired Outcomes:

An integrated autonomous robotic hard floor scrubber with surveillance features that is able to improve productivity and work conditions for the cleaning and security workers.

Background of Problem:

Currently, the cleaners at Heartbeat@Bedok have to follow a schedule when operating the hard floor scrubber to sweep or mop the floor. To minimise disruption to consumers, the hard floor scrubber is only deployed during off-peak hours as the cleaning area needs to be cordoned off during the cleaning process.

Due to the large public space, the schedule for cleaning is also very tight as there is limited time available to clean all areas using the hard floor scrubber. Furthermore, not all cleaners are able to operate the hard floor scrubber and this further limits the efficient manpower deployment of manpower. The total cleaning manpower comprises 1 supervisor and 4 cleaners with an average age of 40+ years *(2 shifts of 2 hours each from 7am to 10.30pm.*

In terms of patrolling duties, the security guards currently patrol the premises on a fixed schedule. For large and inaccessible areas, security cameras are fixed on ceiling or walls, which mean that the cameras are immobile. The current manpower for patrolling involves 1 supervisor and 6 security officer with an average age of 40+ years *(2 shifts of 12 hours each starting at 8am and 8pm).*

The challenge is for the industry to come up with a solution that can perform both cleaning and security surveillance functions concurrently, so that the premises owner can channel existing manpower resources to other higher value-added work.

Technical Requirements:

1. It should automatically move to the designated area for cleaning and surveillance from the charging point. Thus, it should be able to take an elevator by itself. The device's location should be tracked during operation for security purpose.

2. It should ensure that the surveillance features are still functioning while making its way back to the charging point on its own when power is low.

3. The proposed solution to operate for at least 3 operation hours for every 2 hours charging duration.

4. There should an option for the device to be remotely operated.

5. QP/LEW is to certify the installation of the device is safe for the purpose of the trial.

6. The device must comply with the necessary building regulation requirements.

7. Operation of the device should be efficient (e.g. cost efficient, energy efficient, manpower). Minimal human intervention should be involved in carrying out its work.

8. The device should require minimal installation and noise disturbance to the public when in operation.

9. The device should be weather proof as some corridors is subjected to wet weather although it is mainly for indoor usage.

10. Device should not be too bulky as it should be transportable by a class 3 vehicle.

11. The surveillance camera must be able to record 24 hours with minimal charging. It should be able to have face-recognition technology, data analytics and detect any abnormalities *(e.g. damage to property/theft/missing person/Lost and Found/trespassing/area not secure like door not lock or door open after office/operation hours)* with alerts to be captured for back-end reporting.

12. The proposed solution should be easy to operate and should be able to effectively scrub the floors and provide reports for management reporting. For example, it should be able to report on the cleaning performance *(frequency of cleaning, areas covered, photographs of defects, etc).*

What solutions you are interested in (if any*)?*

1. Centralised Dashboard with Real-Time Collection Requirements
2. Real-time station based
3. Auto-Generated Notification
4. Reliable and Easy-to-Use
5. Data Export Capability

Timeframe for development of proposed solution/product

After start of project (About 18 months' project cycle)

1. Completion of site evaluation at Heartbeat@Bedok, concept design and detailed design 3 months after start of project

2. Completion of working prototype ready for trial 10 months after start of project

3. Trial, evaluation and refinement of working prototype for approximately 6 months at Heartbeat @ Bedok

4. Provide reports and findings of the trial

5. Completion of full functional end product within 18 months from the award of project

6. Provide milestones update

Requirements of prototype

Prototype should minimally comply with the points listed under Technical Requirements.

Costing and Procurement

Interested proposals are to propose a cost effective solution which minimally meets the needs as stated in the problem statement. Considerations will be on the costing of the proposed solution.

If the pilot trial proves to be successful, the company may purchase 7 units for Heartbeat@Bedok, depending on the number of projects and requirement of 1 unit per floor.

Market Potential for proposed solution/product

Proposed solution could be adopted by building owners, managing agents, contractors in the security and cleaning industries.