

第二代智能馬桶清潔系統即將面世

Upcoming Launch of Second Generation of Smart Toilet Bowl Cleaning System

機電署研發的第一代物聯網智能馬桶清潔系統，在2021年日內瓦國際發明展榮獲金獎。團隊其後繼續利用創新科技，不斷改良技術，成功將系統升級至第二代，並於機電署總部試行運作。我們預計於6月完成系統調試後，便會邀請客戶前來體驗系統的表現，並探討在不同場地的廁所廣泛應用系統。

第二代物聯網智能馬桶清潔系統在性能和功能方面均有所提升，更方便於不同場地應用和管理。與第一代系統相比，新設計增設全自動模式，提供全自動化清潔功能。新一代系統由馬桶清潔機械人、自動導引車和物聯網衛生監察平台組成，可實時收集各個廁格的使用量及氣味水平等數據，並提供實時數據分析，以監察廁所的清潔狀況。第二代馬桶清潔機械人亦採用嶄新設計，包括自動導航底盤和優化清潔功能，清潔效果更佳。機械人除了按預定日程表定時進行清潔外，還可透過物聯網的數據監察，根據實際需要自動導航至相應廁格，增加清潔次數。機械人運用人工智能為馬桶內壁進行實時圖像分析，然後按三個級別評定其清潔程度屬於「乾淨」、「一般」還是「骯髒」，再以對應的特設清洗模式，使用不同的水量和洗刷程序清潔馬桶內壁及上緣位置。完成清洗後，機械人會分析清潔效果，如發現仍有污漬，便會再次進行清洗。

智慧廁所是智慧城市不可或缺的重要設施。全新物聯網智能馬桶清潔系統不但可提高廁所的衛生水平，減低細菌和病毒傳播的風險，還可改善清潔人員的工作環境，減輕他們的工作負擔，達致以創新科技全面提升廁所管理效能。

智能馬桶清潔機械人在機電署總部男廁內進行清潔。

A smart toilet bowl cleaning robot performs cleaning in a male toilet at the EMSD Headquarters.

The first generation of the Internet of Things(IoT)-enabled Smart Toilet Bowl Cleaning System developed by the EMSD was awarded the Gold Medal at the International Exhibition of Inventions of Geneva 2021. The team has continued to make advancement by utilising innovative technologies, and eventually upgraded the system to its second generation, which was given a trial run at the EMSD Headquarters. We will invite client departments to come and experience the system's performance, as well as exploring its wider application in toilets in different venues upon completion of its commissioning in June.

Both the performance and functionality of the second generation of the IoT-enabled Smart Toilet Bowl Cleaning System have been improved, making it more convenient for application and management in different venues. Compared to the first generation of the system, the new design adds in a full auto mode, providing autonomous cleaning function. The new generation of the system consists of a toilet bowl cleaning robot, an automated guided vehicle, and an IoT-based sanitation monitoring platform. The system can collect data on the usage and odour level of individual toilet cubicles in real time and provide real-time data analysis to monitor the cleanliness of toilets. The second generation of the toilet bowl cleaning robot also features a brand new design that includes an auto-navigation chassis and an enhanced cleaning function, which improves cleaning results. In addition to scheduled cleaning, the robot can increase the frequency of cleaning by navigating itself to individual toilet cubicles according to the actual needs deduced from IoT data monitoring. The robot employs artificial intelligence to carry out real-time image analysis of the inner wall of toilet bowls, and assesses their cleanliness which are categorised into three levels, namely "clean", "normal" and "dirty". Upon the assessment, the robot uses specific cleaning modes with varying amount of water and scrubbing procedures to clean the inner walls and rims of the toilet bowls. Following the cleaning process, the robot will evaluate the cleaning results and initiate another cleaning cycle if stains are still found.

Smart toilets are an essential and indispensable facility of a smart city. The new IoT-enabled Smart Toilet Bowl Cleaning System not only enhances hygiene of toilets and lowers the risk of the spread of germs and viruses, but also improves the working environment of cleaning staff and reduces their workload, achieving a comprehensive enhancement of management effectiveness of toilets with innovative technologies.



<http://bit.ly/3PGJelH>

請掃描二維碼觀看第二代物聯網智能馬桶清潔系統的示範短片。

Please scan the QR code to view the demonstration video of the second generation of the IoT-enabled Smart Toilet Bowl Cleaning System.

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機械人使用主毛擦(左)和滾筒(右)進行清潔。
The robot performs cleaning with a main brush (left) and a roller (right).

