

共創智慧之都

Co-creating a Smart City

機電工程署(機電署)一直持續改進，致力發展創新科技(創科)，推動機電數碼化和培育優秀團隊，為客戶部門提供嶄新的機電工程服務。我們亦積極發揮「促成者」和「推廣者」的角色，致力推動創科應用，以打造香港成為智慧之都。

首先，我們在新成立的客戶服務中心和互動學習中心分別應用數碼化系統及創科訓練設施，以提升維修保養效率和學員的技術水平。我們又設立機電創科專區及網上創新科技協作平台，加強與大學和初創企業在創科上的協作，為他們提供項目試驗場地及技術支援，並於不同範疇引入和測試先進的系統和設備(包括於總部大樓設立「洞穴式自動虛擬環境」系統)，以及推行多個先導試驗項目，如人臉識別系統、立體泊車系統等等。我們希望透過不同措施配合客戶在服務市民上的發展需要，與客戶及機電業界同心共創智慧香港。

The Electrical and Mechanical Services Department (EMSD) is committed to seeking continuous improvement. We promote E&M digitisation and establish an excellent work team, striving to provide electrical and mechanical (E&M) engineering services to our client departments with innovation and technology (I&T). We proactively play the role of a “facilitator” and a “promoter” to drive the application of I&T with a view to building Hong Kong into a smart city.

First, digitised systems and I&T training facilities have been applied in our newly established Customer Service Centre (CSC) and Interactive Learning Centre (ILC) to enhance maintenance efficiency and the technical capability of trainees. We have also set up the E&M InnoZone and E&M InnoPortal to collaborate with universities and start-ups in I&T and provide testing grounds for their projects with technical support. Furthermore, advanced systems and equipment in various areas have been introduced and tested, including installation of the Cave Automatic Virtual Environment (CAVE) system in the headquarters building and the implementation of several pilot projects, e.g. the facial recognition system and puzzle parking system, etc. We hope that we can cater to the development needs of our clients in serving the public through various initiatives and co-create Hong Kong into a smart city with our clients and the E&M trade.

機電設施數碼化

機電署積極支持政府近年打造本港成為智慧城市的政策，為此，我們積極推動機電設施數碼化。機電署署長薛永恒先生在2018年12月4日舉行的傳媒聚會中表示，機電署總部大樓設立的新客戶服務中心，配備先進的遙控監測系統，對全港約1 800組交通燈和約200條行人隧道的機電系統進行實時監控，提高系統的可用性和可靠性，並加強客戶連繫。

同時，我們一直投放資源發展數碼化資產管理系統，包括「建築信息模擬—資產管理」(BIM-AM)系統，優化機電設施的維修保養效率。另外，機電署正逐步為400多幢每年耗電量超過50萬度電的政府建築物，於其機電設施加裝數碼化設備，提升有關資產的運作效率和環保表現。

除此以外，為加強工程項目的管理，協助客戶有效地審視不同的設計方案，我們於建築及改善工程的前期規劃採用「建築信息模擬」，並且利用「洞穴式自動虛擬環境」技術，事先進行模擬，讓客戶在比例

接近一比一的虛擬實境中親身體驗不同的設計方案，這不但可節省製作實體模型的時間和資源，更可迅速評估和修訂設計，有效提升工作效率。

培訓團隊

為配合新的發展趨勢，機電署在總部大樓設立互動學習中心，除了能讓學員在虛擬實境中接受訓練，以提升學員的維修技術水平外，亦期望創新科技的互動方式能吸引年輕人入行。虛擬環境讓學員無須到達現場(特別是受管制場地(如手術室)或隱蔽的危險地方(如升降機槽))而能夠虛擬作業，多元的學習模式可進一步令學員熟習運作和維修程序，從而為客戶提供更優質可靠的服務。

今年9月，我們更結合BIM-AM系統及「洞穴式自動虛擬環境」設施，並應用於建立香港兒童醫院和天水圍醫院的虛擬環境，進一步加強對機電署維修人員的培訓。

善用創科

作為創科的「促成者」和「推廣者」，機電署積極引入新科技，並鼓勵業界協作同行，共同制訂創新方案。我們的網上創新科技協作平台致力促進業界交流經驗和技術，為政府部門配對合適的創科項目。由今年3月至今，共收到超過100個「創科願望



人臉識別系統
The facial recognition system

機電署署長薛永恆先生在傳媒聚會時向記者介紹網上創新科技協作平台，並表示該平台為政府部門成功配對合適的創科項目。他亦即場示範最新的「洞穴式自動虛擬環境」技術如何與我們研發的「建築信息模擬—資產管理」系統結合應用。

Mr. Alfred Sit, Director of Electrical and Mechanical Services, introduced to journalists the E&M InnoPortal at the media gathering, and said that the platform had successfully matched suitable I&T projects for government departments. He also demonstrated on the spot how the latest CAVE technology could be integrated with the BIM-AM system we developed for application.



清單」及70多個創新解決方案，涵蓋物聯網、自動化科技、人工智能等範疇。目前，我們正協助大約40個項目於不同政府場地和設施進行試驗。

其中一個我們的創科項目，是為客戶部門提升人流管理效率。我們率先在總部大樓推行先導項目，在部分員工出入口閘機安裝智慧人臉識別裝置，測試於大樓出入口管理上應用人臉識別技術的成效，以及市場上有關供應商所提供技術的計算準確度。視頻內容分析技術日趨成熟，並具有一系列的功能對視頻進行智慧分析(人臉識別屬其中一項)。就智慧人臉識別技術而言，系統會把拍攝所得影像與資料庫記錄進行比對，有效識別出已登記人士的身分，加強大樓內保安。我們將陸續測試視頻內容分析技術的其他功能，例如人數統計、錯誤方向檢測、排隊長度監控等等，並會把分析結果與客戶分享，以推廣並應用該技術於不同的客戶部門。

另外一個創科項目，可提高道路的使用效率。我們早前與客戶部門組織考察團，到粵港澳大灣區考察最新的創科項目，其中高三層的「升降橫移式立體泊車系統」可增加泊車地點的泊車位數目，於是我們主動引入該系統，並以總部大樓作為試驗場地，進行先導項目，預計系統於2019年年中完成安裝，稍後再向運輸署提供有關測試結果以作參考。另外，為預防交通事故，加強道路安全，我們與初創企業合作試行「4S智能駕駛安全方案」，透過安裝在車頭的感應器及視像鏡頭，監察路面情況，並通過收集行車記錄的大數據，分析駕駛行為，識別交通黑點，以實現「路上零意外」的願景。我們將會向其他客戶部門推廣相關技術的應用。

E&M Digitisation

The EMSD actively supports the Government's policy of building Hong Kong into a smart city in recent years. To this end, we proactively promote digitisation of E&M facilities. Mr. Alfred Sit, Director of Electrical and Mechanical Services, said at a media gathering held on 4 December 2018 that the new CSC established in the EMSD Headquarters Building is equipped with the advanced remote monitoring system, which can monitor around 1 800 sets of traffic light and the E&M facilities of around 200 pedestrian tunnels across the territory in real time, improving the system

availability and reliability, as well as connection with customers.

In addition, we have been investing resources in the development of digitised asset management systems, such as the Building Information Modelling - Asset Management (BIM-AM) system, which enhances efficient maintenance of E&M facilities. Besides, the EMSD has been carrying out the installation of digitised equipment for the E&M facilities at more than 400 government buildings with annual electricity consumption exceeding 500,000 kWh to enhance operational efficiency and environmental performance of the buildings.



「洞穴式自動虛擬環境」技術結合BIM-AM系統，能讓使用者融入現場環境，親身體驗利用BIM-AM系統為機電設施進行維修保養以實現智慧保養的目標。智慧保養是我們為客戶提供的重要增值服務之一。

By integrating the CAVE technology with the BIM-AM system, users can assimilate into the on-site environment and personally experience the repair and maintenance works for E&M facilities with the BIM-AM system to achieve the goal of smart maintenance. This is one of the most important value-added services we provide to clients.



在機電署支持下獲創新及科技基金資助的「4S智能駕駛安全方案」，可發出不同提示，例如顯示車輛距離相撞的剩餘時間及前方有行人橫過馬路的提示，有助減少交通意外發生。

The 4S Solution, which is funded by the Innovation and Technology Fund with the support from the EMSD, sends out different reminders, such as showing the remaining time before a car crash happens and the presence of pedestrians crossing the road, which help reduce the number of traffic accidents.

Furthermore, to enhance the management of engineering projects and assist clients in reviewing different design proposals effectively, we have adopted the Building Information Modelling and CAVE technology to create a virtual environment in advance at the early planning stage of construction and improvement works. Clients can personally experience different design proposals in a virtual reality (VR) setting with ratio close to 1:1. This not only saves time and resources for producing an actual mock up, but also enables prompt assessment of and revision to the design, which can effectively improve work efficiency.

Excellent Work Team

To tie in with the new development trend, the EMSD has set up in our headquarters building an ILC, which not only enables training in a VR setting to enhance trainees' maintenance skills, but is also expected to attract young people to join the trade through an interactive training mode with innovative technology. The virtual environment allows trainees to further familiarise themselves with operation and maintenance procedures under a diversified mode of learning without being on-site, particularly in places under control (such as operating theatres) or dangerous locations (such as lift shafts), thereby providing clients with better and more precise services.

We combined the BIM-AM system with CAVE facilities in September 2018, and applied them to simulate the environment of the Hong Kong Children's Hospital and Tin Shui Wai Hospital, to further strengthen training of the EMSD's maintenance staff.

I&T Application

As an I&T "facilitator" and "promoter", the EMSD takes the initiatives to bring in advanced technologies, and encourages the industry to collaborate and work out innovative solutions. Our E&M InnoPortal is dedicated to experience and technology exchange, and matching suitable I&T projects for government departments. Since March this year, we have received a total of more than 100 "I&T Wish Lists" and over 70 innovative solutions, covering such areas as Internet of Things, automation technology and artificial intelligence. At present, we have been helping to test more than 40 projects in different government venues and facilities.

One of our I&T projects is to improve the efficiency of crowd management for client departments. We have taken the lead to implement a pilot project in our headquarters building by installing intelligent facial recognition devices at certain staff entry and exit gates to test the effectiveness of the application of facial recognition technology in access management of the building, as well as the accuracy of the algorithm developed by the supplier. Video content analytics technology is becoming increasingly mature, with a series of functions for smart analysis of videos, facial recognition being one of them. The facial recognition system automatically compares the captured images with records in the database, which can effectively identify the identity of registered persons to enhance security. We will test other features of the video content analytics technology one by one, such as statistics on the number of

people, detection of wrong direction and monitoring of queue length, and will share the results of the analysis with clients to promote the application of the technology to different client departments.

Another I&T project is to enhance the efficiency of road utilisation. We organised a delegation with client departments earlier to the Guangdong-Hong Kong-Macao Greater Bay Area to study the latest I&T projects there, among which the three-storey Puzzle Parking System could increase the parking capacity of parking locations, we therefore took the initiative to bring in this parking system and made our headquarters building a testing ground for the pilot project. The system installation is expected to be completed in mid-2019, and the testing results will be provided to the Transport Department for reference later. In addition, to prevent traffic incidents and strengthen road safety, we have co-operated with a start-up company for trial run of the Safematics Smart Safety System (4S) Solution. Traffic conditions are monitored through sensors and video cameras installed in the front of vehicles. By collecting the big data of driving records, the system can analyse drivers' driving behaviour and identify traffic blackspots to achieve the vision of "Zero Accidents on the Road". We will promote the application of such technology to other client departments.

客戶如對創科項目有興趣，請與我們的高級工程師林鑫駿先生聯絡(電話：2808 3879)。

If you are interested in I&T projects, please contact Mr. Tommy Lam, Senior Engineer, at 2808 3879.