

HKIE CAD Online Symposium 2021

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New Generation of Automation & Digital Intelligence – The AI

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Ir YIU, Professor YUEN, Ir SIT, Hon Ir Dr LO, Mr TONG, Mr BUTT, distinguished guests, ladies and gentlemen.

Good Morning. It gives me great pleasure to exchange views and insights with fellow control and automation engineers on how we can embrace the power of AI.

We have been experiencing physical distancing these days but we can always stay socially connected like what we are doing in today's Symposium. In fact, a recent survey revealed that the pace of digital transformation is 25 times faster than that before the pandemic. The COVID-19 pandemic has demonstrated that we engineers possess adaptable mindsets. The pandemic has enormously speeded up the deployment of automation and digital intelligence solutions. We engineers have produced our own V-A-C-C-I-N-E, which stands for VR, AI, Collaboration and Cooperation, Innovative Network and Evolution. I believe our engineering vaccine will lead us through the tough time during COVID-19, and start a new chapter of artificial intelligence.

Virtual Reality

The on-going pandemic has forced businesses to adapt to a new normal. A clear example of this is training. Instead of physical training which we were so used to, most training are now taking place virtually. Whether you are a teacher, a student or a parent, you have all become experts in the use of communication platforms such as Zoom for hosting seminars and lectures. While teachers adopt AI-calculated backdrop of their favorite scene when delivering their PowerPoints and lecture notes, students receive classes online anywhere even in mobile phones.

Sharing the vision of promoting innovative technologies, EMSD has collaborated with the lift industry and the VTC to jointly develop a VR system in 2019 to train both newly

joined the trade as well as practicing technicians. The system allows users to complete high-risk lift maintenance scenario training in a simulated and totally safe environment. Such VR training is very similar to playing computer games, and will make the work of the lift profession much more attractive to the younger generation.

Artificial Intelligence

In the difficult times during the pandemic, doctors are heavily engaged in treating the patients. It accelerated the development of an AI system to analyse patients' chest X-rays to help identify COVID-19. It proved that the AI engine can identify an infected faster and more accurate than professional radiologists. AI technologies are now readily available, and it is a matter of how you explore applications of this important new technology to suit your needs. In EMSD, we have deployed AI-based robotic solutions for fever screening, sounding out alarm when your face is hot but not so when you are holding a cup of hot coffee, identifying people not wearing masks, automatic cleaning and disinfection, as well as performing intelligent delivery tasks. These intelligent devices help reduce human contacts, perform repetitive tasks round the clock without getting tired, and greatly reduce the risk of COVID-19 infection. We are also exploring AI technologies to help predict equipment fault, optimize equipment performance and reduce energy use. We conduct trials to provide early warning of potential pump and motor failure through analyzing the vibration pattern with machine learning techniques. Various AI machine learning models are adopted to identify rooms to improve chiller plant operations and hence optimize the energy use for HVAC systems. Moreover, trials are conducted to evaluate elevator healthiness. With the assistance of AI-analytics and deep learning, abnormalities were detected in real-time and remotely for prompt response to any escalator failure.

Collaboration and Cooperation

To facilitate collaboration and cooperation between Innovation and Technology parties of Hong Kong, EMSD established an online I&T collaboration platform, namely our patented “E&M InnoPortal”, in 2018. It matches I&T wishes of Government departments with creative I&T solutions from the start-ups and universities. As at February 2021, the E&M InnoPortal has collected more than 330 I&T wishes from various government departments, over 720 solutions from start-up companies, and there are more than 110 successfully matched I&T solutions. One of the successful cases is the development of

Smart Prisons. Through the application of various innovative technologies, such as AI, Internet of Things (IoT), Bluetooth low-energy consumption technology and Robotics, Smart Prisons have enhanced the efficiency of prison management and the level of security in prisons. The resources and talents from all sectors were optimized and further enhanced through cross-matching, collaboration and integration via the “E&M InnoPortal” ecosystem.

Innovative Network

Typhoons and rainstorms are very common in Hong Kong. Drainage Service Department or DSD in short has set-up many hydrological stations throughout the territory to monitor the effectiveness of drainage facilities and provide alerts for potential flooding. Better precursors of flooding likely to happen is only possible by collecting more data, and from more sites. But these come with a cost, involving higher investment in both time and money for installation of such stations. In early 2019, DSD and EMSD collaborated to make use of EMSD’s shared IoT infrastructure that we called the Government Wide IoT Network, or GWIN in short, to greatly reduce the set-up cost and time for collecting previous data anywhere in HK. GWIN uses Low Power Wide Area Network technology. It is a cost-effective solution for close-to-real time monitoring and subsequent analysis and enhancement of asset performance. Later on my colleague will cover the GWIN in greater depth in his presentation. So please stay tuned.

Evolution

The Government has launched the Smart City Blueprint 2.0 in December 2020, outlining more than 130 initiatives that enables Hong Kong to evolve into a Smart City. Many of these initiatives rely on automation and digital intelligence. For example, the “Smart Toilet” trial scheme uses IoT technologies and AI to enhance toilet management and utilization. The same technologies are also applied to parking space monitoring system for providing real-time vacancy data. The various Smart City initiatives would not have come in a more opportune time when we faced the once-in-a-lifetime pandemic, and the need for all of us to evolve from the established service modes to a “new normal”. Thanks to the rapid development of automation and digital intelligence over the past decade, it has taken us very little time to develop the right solutions that can take us to the new normal. For example, the OGCIO has launched “LeaveHomeSafe”, which allows users to record their whereabouts and notify them if they have visited a place subsequently

linked to a COVID-19 infection. The other side, HKPC developed “Know Touch”, a touchless lift control panel, to minimise the risk of lift users from contacting the disease when touching the call buttons inside a lift car.

And may I quote one last illustration of using automation and digital intelligence to enable our life back to the New Normal. Earlier in February, EMSD assisted FEHD in deploying the cloud-based IoT solutions for crowd monitoring and control at 16 Point-of-Sales of flowers (年花銷售點). With the adoption of automatic people counting using different infrared and LiDAR sensors, and supported by AI-based decision in issuing “traffic light” for crowd control, the potential of COVID-19 infection was minimized. More than 870,000, or around one-tenth of Hong Kong citizens, continued to enjoy the traditional event despite the COVID-19. No one was reported to have been infected for working or visiting these flower markets. I am sure that the CAI practitioners would continue to contribute to the smart city development.

In closing, I would like to express my sincere thanks to the HKIE for hosting this meaningful Symposium again amid the difficult COVID-19 pandemic. This year, COVID-19 vaccines have brought us hope in bringing back our normal life, notwithstanding that some of us still hesitate to get vaccinated in view of the side-effects. However, I believe that our engineering VACCINE are even more-promising, with no undesirable side-effects. I am confident that no one here would have the slightest doubt to take the engineering vaccine. I wish the HKIE CA Division Symposium 2021 a great success and fruitful sharing of the latest successful innovation projects. Thank you very much.

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