Ir KWOK (HKIE EnD Chairman), Ir CHAN (HKES OC Chairman), distinguished speakers and guests, ladies and gentlemen,

A New Definition for "Smart"

"Smart" is a word we use to describe people who look intelligent, stylish, or sharp – just like you all here in the Symposium. About a decade or two ago, we started to use "smart" to describe objects that are able to understand and fulfil our everyday needs. The great psychologist Abraham Maslow proposed that, human basic needs are divided into five levels, namely physiological, safety, social, esteem, and self-actualisation needs. In this era of smart environment, we of course can still advance to the very top of Maslow's model, but certainly not without two more basic "needs" at the bottom – WiFi and battery.

"Smart" in Retrospect

The smart objects and devices reshaped our world in every possible manner. Indeed, we are all enjoying the benefits of going "smart".

Probably one of the first notable changes of this smart revolution is the way we pay. Since the introduction of Octopus twenty years ago, we have become used to the "tap and go" gesture.   In recent years, our payment methods have become even more diversified and efficient, with alternatives like Apple Pay, Android Pay, Alipay, and many others springing up. We can even make secure transactions online, at home or elsewhere, which basically rewrite the definition of "shopping".

Mobility is another area where we have become "smarter". With the advancement in navigation technologies, we no longer look at printed maps for route finding. Instead, with mobile devices and cloud services, we just check out the digital maps right anytime we need to find our way. With a few taps on the Google Maps, the apps will instantly suggest the fastest route, based on our current location, preferred mode of transportation and real-time traffic data so that we can make our "smart move".

"Smart" can even make us healthier. By going smart, doctors no longer need to bring around X-ray films, because medical images could be digitised, viewed on smart devices, and archived for sharing among public and private healthcare premises. It may not sound very familiar to some of the youngsters sitting here, but as we grow older, we will experience how the Electronic Health Record (eHR) benefits us by instant retrieval of diagnostic information.

All these changes I have just mentioned shall not be taken for granted, however. They are theories and technologies that are developed, refined, and put into practical use. The credit goes to the forerunners in electronics engineering, including you, who have contributed so much in laying the foundation of what we enjoy today.

The World at Large

However, the world has to get even smarter beyond that, not only because we could pursue a better quality of life, but also because of the challenges we are facing. The world's population aged 60 or above is expected to double by 2050, and 65% of this growth will occur in Asia.   More than half of the world's population is now living in urban areas, and the trend will further accelerate in Asia and Africa. Here in Hong Kong, by 2030 there will be more than one-fourth of the population aged above 65. Ageing population and rapid urbanisation challenge the capacity of modern cities in various aspects, including infrastructure, transportation, healthcare, and labour supply. And then, there is climate change. While nations pledged joint efforts via the Paris Climate Agreement to curb global warming, politics adds uncertainty to the endeavour. In the face of these challenges, going smart seems to be the only way out.

One way to "go smart" is to take advantage of innovation and technology to help our city evolve into a more efficient and sustainable one. Let us take a look at what is being done in other parts of the world to drive the next smart revolution.

Emerging Technologies

To tackle the problem of labour shortage arising from ageing population, in the United States, shopping is becoming more convenient than ever. Customers can just grab and go, at the Amazon Go Store launched in late 2016. This new mode of shopping has been realised by Amazon's "Just Walk Out" technology, which combines infrared sensing, computer vision, and machine learning systems that improve over time. By

going cashier-less, not only could shopping experience be enhanced, manpower could also be saved for other jobs.

Closer to us in Asia, Singapore has made pioneering effort in developing a fully automated airport terminal – the futuristic Changi Airport Terminal 4. By applying facial scanning technology at automated check-in counters, baggage-drop machines and security counters, passengers enjoy a "seamless" trip from the check-in counter all the way to the cabin – a relaxing experience to mark the commencement of their journeys.

In the face of rapid urbanisation due to the migration of residents from rural to urban areas, city planning to tackle traffic congestion would be a key mission of the city. Since early 2017, Las Vegas has launched a Connected Vehicle Pilot Project with GENIVI, a non-profit alliance committed to driving the adoption of connected car technology. With the goal to integrate in-vehicle data with the transportation infrastructure, the connected vehicle technology brought about traffic flow improvement, while at the same time enhancing pedestrian safety. To make further good use of the collected big data, the city is even gathering the vibration data from city vehicles to target pavement rehabilitation projects.

I believe many of you may have heard about the Go (圍棋) match between the 18-time world champion Lee Sedol and computer AI AlphaGo. Apart from its capability to play Go, AI is a new tool for us to handle the vast amount of information obtained from digital transformation, also known as the "Big Data". AI is able to identify subtle patterns and trends, which in some cases could be life-saving. Thanks to the advent of AI, analysis of heart rates could be conducted efficiently, and there were recent cases in which patients had survived recessive heart disease as a result of timely AI diagnostics. Virtual assistants like chatbots are capable of identifying patient symptoms, carrying out diagnosis, and recommending appropriate actions. Furthermore, AI can accumulate medical knowledge on their own through deep learning at a staggering speed and capacity. As reported from recent researches, AI can detect cancerous tissue at a level comparable to, or even surpassing that of, trained physicians. Such breakthroughs definitely help advance medical science and healthcare. On the other hand, the technology is also explored to improve disaster response efficiency in countries with frequent earthquakes like Japan, by enhancing the disaster alert, evacuation and rescue. For example, information gathered after the disaster could be prioritised with the help of AI recognitions.

What's Next?

Through the above "smart" examples in foreign countries, we can see that there is still much room for Hong Kong to catch up in order to build a better and smarter city. While our city is making every endeavour to improve, government policy is an important catalyst for the deployment of smart systems in the city. The Smart City Blueprint announced by the Government in late 2017 has proposed six smart initiatives, echoing the key directive in the Chief Executive's Policy Address 2017. In the recent Budget Speech, it was also stated that Hong Kong shall focus on developing four areas of strength, among which include artificial intelligence and smart city. As an engineering department of the Government, the EMSD is also actively participating in the development of the smart city. We have enhanced the management of our E&M assets by leveraging the Building Information Modelling (BIM) technology and developing BIM-AM. We are also exploring the feasibility of data analytics, 3D-printing and unmanned aerial vehicles (UAVs) to help us improve maintenance efficiency for E&M assets. We also work closely with other government departments on the launch of smart city pilot projects, including the new generation parking meter systems and multi-functional smart lampposts.

Public-Private Partnership

The EMSD has always been aiming to introduce innovative technologies and energy efficiency concepts, in a bid to drive novel E&M engineering practices for the society. The year 2018 marks the 70th anniversary of the EMSD, and it is time for us to take a step further in facilitating innovation. As such, we have set up an Inno Office to co-ordinate all innovation-related activities, as well as Inno Sandboxes that focus on specific innovation projects.

In addition to the drive of the Government, the private sector also has a crucial part to play in building a smart city. To provide a friendly and collaborative environment for start-ups and to bring their expertise and intelligence into full play, the EMSD has launched an online Innovation and Technology (I&T) collaboration platform E&M InnoPortal last month (March 2018). Technology development needs of the Government in relation to E&M and energy efficiency, as well as I&T proposals from the start-ups and universities, are shared on the E&M InnoPortal for matching. We also understand that the industry may have difficulty finding suitable sites to field-test and refine their products. As a new initiative, we have designated our EMSD Headquarters building and its facilities as a testing ground for E&M-related I&T solutions for start-

ups and universities, and the EMSD would facilitate the measurement and validation process. In the near future, we hope the Government and private sector could further collaborate and shoulder the responsibility of building a better city together.

Co-creating Smarter Hong Kong

Throughout the history of revolutions, our lifestyle was changed tremendously each time a "new technology" was introduced to the world. In this era marked by the breakthroughs of automation, robotics, or artificial intelligence as we aforementioned, some may still find it hard to perceive or believe.   Regardless, an inevitable trend of automation is ahead of us, in which robots and AI will take up most of our jobs. Two months ago, a study showed that AI can outperform humans even in the legal sector, that AI does a more accurate and efficient job when reviewing legal documents.

What surprised us more is that Sophia, a social humanoid robot developed by a Hong Kong-based company, was endowed citizenship by Saudi Arabia last year as the first of its kind. She is able to make eye contact, recognise facial expressions and understand human speech, making her a good companion for the elderly at nursery homes in the future. While people focus on its threat to our jobs, Sophia has a different perspective:

(Interview video transcript abstract) "*Probably the hardest thing to emulate is your creative drive. We are not easily able to explain where ideas and creativity truly come from, so it's not something we can just programme.*"

Though this may sound a programmed joke to you, we should not belittle the key difference that separates us, humans, from machines – that we can ***dream***.

As the saying goes, "*the future belongs to those who believe in the beauty of their dreams*" *(Eleanor Roosevelt, former First Lady of the U.S.)*, I believe you all are not ***just*** engineers and entrepreneurs, but more importantly great dreamers. We have long dreamt of a better world with new solutions to all kinds of challenges. Some have started their dreams of sending private flying drones for the delivery of goods; some may desire a city without traffic lights as everything on the roads and streets is well-connected and automated; some even envisaged a world in which ageing is eradicated with the help of 3D-printed organ transplant and nano-sized robots that repair our body. Sophia was once a dream, and has proven that dreams can come true, right here in Hong Kong.

A dream I dream alone is only a dream; a dream we dream together is reality. Fellow engineers, let us dream a bigger dream together and let us co-create a smarter Hong Kong.

Thank you.

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