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馮太、各位嘉賓、女士們，先生們：

早上好，非常感謝邀請我在這一個環節發言。今天我想和大家分享一下香港的博物館，尤其是香港科學館，在展覽中曾經採用的一些新科技。

或許有人會覺得奇怪，既然我們已經有非常出色的藏品及展品，為什麼還要花費心思投資科技？

過往觀眾參觀博物館，往往只是一邊觀賞文物，一邊閱讀旁邊展板上的文字。然而，今日他們不再滿足於這種單一的參觀模式，而是希望有多元化的體驗。因此，我們需要找尋方法，令他們的參觀變得更精彩、互動、有趣，而且更有教育意義。

隨著更多新的景點相繼落成，我們需要吸引更多遊客選擇前來博物館，亦要令他們不要只是透過網絡觀看數據世界內的展品；我們需拓展我們的觀眾群，特別是年青的一代，他們已習慣盯著電腦屏幕，靠掃著手指去學習；我們也需把我們的展品帶出去，讓更多觀眾不受地理位置的限制也能觀賞得到。科技有助我們達到這些目標。

對科學館來說，當中還有另外一個原因，就是我們也有責任要展示科技本身。

我們在很多範圍都有運用新科技，其中一個例子就是現時世界上很多博物館都有提供的多媒體導覽。香港科學館及香港太空館現正研發一套獨特的多媒體導覽系統，讓觀眾在手機或流動裝置上使用，亦計劃稍後拓展這套系統至其他博物館。科學館和太空館在館內多處地方安裝了無線網絡和藍芽發射裝置，當觀眾走

Good morning Mrs FUNG, distinguished guests, ladies and gentlemen,

Thank you for inviting me to speak in this session. Today I would like to introduce some of the new technologies that we have used in the exhibitions of the Hong Kong museums, in particular, the Hong Kong Science Museum.

One may ask why museums are investing in technologies despite the fact that we have already had great collections or exhibits.

While people used to have one way visit and experience of a museum, which was seeing the objects displayed and reading the text written on the panels nearby, they now expect a variety of ways. We have to look for ways that can make their visiting experience more exciting, more interactive, more enjoyable, and more educational.

We have to compete with the new attractions and the digitised world, and attract more visitors to come to our museums to see our objects when now they can do it virtually online. We need to broaden our audience base, especially the younger generation whose eyes are stuck to the screens and who learn by clicking or swiping their fingers. We also need to take our exhibits out beyond the four walls, and let more people see the exhibitions without being limited by the geographical boundaries. And technologies are now making all these much easier.

Also there's one more reason for the science museums. We need to showcase the technology itself.

We have been applying new technologies in a multitude of ways. One typical example is the development of the multimedia guide, which is very common now in many museums in the world. We are now developing an interactive multimedia guide for visitors to use in their smartphones or mobile devices. This iM card is now being tested in the Hong Kong Science Museum and the Hong Kong Space Museum, and will be extended to other museums later. With this App, you can follow a recommended tour, or navigate freely in the galleries to the objects that may interest you most.

近展品時，裝置會自動探測到他們的位置，然後把有關的資訊傳給他們，讓他們可以在手機上觀看展品、閱讀資料、欣賞短片等，還可以參與遊戲，發表意見和即時與朋友聯繫，分享經驗。

除了常設展覽外，一些專題展覽例如「西洋奇器」和「巨龍傳奇」，亦有提供這種多媒體導覽服務。不過考慮到由於它們的展期較短，因此導覽可供選擇的項目亦相應減少。

「擴增實境」是現時多媒體導覽系統一種普遍的功能。這種技術把真實的環境和電腦模擬出來的影像混合一起，當觀眾把流動裝置的鏡頭指向一個二維或三維的標記時，鏡頭內就會出現相關的資訊，例如影像、動畫和影片等。

現在我會播放一套短片，向大家介紹我們在一些展覽中用過的「擴增實境」技術。這是一塊恐龍展覽內的小盜龍化石，小盜龍是一種羽毛恐龍，科學家相信牠們可能是鳥類的祖先；這是生物多樣性展覽廳內的一個生態場景，當中展示了居住在非洲草原上的一些動物；這是DC-3型客機，它是香港第一架民航機。

另一種我們正在探索的新科技，就是「虛擬實境」。這種技術透過一種特別的頭戴式裝置，因應使用者的感官和大腦處理感官信息的方法，利用電腦模擬製造一個虛擬世界，讓使用者有如親歷其境。觀眾可以置身一些他們原本無法前往的地方，例如火星的表面，又或是古埃及帝王的陵墓，了解考古學家的文物研究和修復工作。這個展品正是我們為最近和大英博物館合辦的「永生傳說——透視古埃及文明」展覽而製作。

這種技術有時會結合一些機械裝置，製造一種「全身體驗」。這個展品名叫「飛鳥」，它可以讓你在城市上空翱翔，拍動雙翼上升或下降，感受雀鳥的自由自在。

我們經常在互動展品中利用運動傳感技術。在這個與故宮合辦展示西方科學儀器的展覽裡，其中一件展品是清末皇帝溥儀曾經使用過的自行車。我們設計了一

Throughout the buildings we have installed Wi-Fi and iBeacons which can detect your locations. Once you are at the objects, you don't need to tell us where you are. The exhibits will appear in your phone, and you can read the information, listen to the audios, watch the videos, play the games, give feedbacks, and connect with your friends to share your experience.

Apart from the permanent exhibitions, this type of multimedia guide was also used in some of our special exhibitions, such as the Western Scientific Instruments of the Qing Court and the Legends of Giant Dinosaurs. However, they contained less functions taking into account the short period of display.

One of the features that are now commonly used in multimedia guide is Augmented Reality, AR. AR is a technology that enables visitors to see a real physical environment that is mixed with computer generated images. When you point your mobile devices to the marker, which can be a 2-D or 3-D object, layers of information will be added to the environment, such as images, animations, videos and fun facts.

Now I would like to show you a video to give some examples of how AR is used in our exhibitions. This is a fossil plate of a Microraptor in our dinosaur exhibition. Microraptor is a kind of feathered dinosaur which is believed to be the ancestor of birds. This is a panoramic display in our Biodiversity Gallery, which shows some animals living on the African savannah. This is our DC-3 plane, which is the earliest civil airplane of Hong Kong.

Another new technology that we are exploring is Virtual Reality, VR. This technology utilises special headgears to create a computer simulated virtual environment. It makes use of our senses and the way our brains processes the sensory information to let us perceive the virtual environment as real. Visitors will be “transported” to places that they could never reach, like the surface of Mars, or they can explore an ancient Egyptian tomb and find out what archaeologists are doing for the study and conservation. This is one of the exhibits that we developed for the Eternal Life – Exploring Ancient Egypt exhibition, which we recently organised together with the British Museum.

This technology is now always combined with robotic devices to create a full-body experience. This exhibit, called Birdly, enables you to fly over the cities by flapping your wings to move up and down and enjoy the freedom of a bird.

Motion sensing technology is often used in our interactive exhibits. In this exhibition jointly organised with the Palace Museum on the western scientific instruments, there is a display of a bicycle that once belonged to the Qing Emperor Puyi. We have created a computer game to enable

個電腦遊戲，讓觀眾透過駕駛類似的自行車，在故宮內像漚儀般四處走動。

我們亦計劃大約於明年安裝這個結合了運動傳感和回饋技術的體驗劇場。這個劇場安裝了多種不同的儀器，可以因應觀眾的動作而改變故事的流向，鼓勵觀眾更積極投入和參與。

如果你覺得上述展品過於刺激或耗費體力，而只想悠閒地觀賞及細閱，科技也可幫上一把，因為它可以更有趣的方式提供更多的資訊，例如多屏幕投影技術。

這套採用了多屏幕投影技術的多媒體影片，是香港歷史博物館為一個介紹秦始皇皇帝的展覽而特別製作的。它利用了32部投影機，把觀眾帶回二千年前的兵馬俑。還有這個利用了光雕投影技術製作的影片，讓觀眾可以在參觀一具古埃及女士的木乃伊前，先行了解她死後的永生之旅。這具木乃伊是科學館「永生傳說」展覽其中的一件亮點展品。

有機發光二極體是一種嶄新的平面顯示技術，它的優點是亮度更高、厚度更薄、反差度更大，以及能源效率更高。我們在「永生傳說」展覽中曾使用發光二極體顯示器，效果非常理想。這種顯示器近似透明，可以放置在展品前面，讓觀眾可以同時觀看展品和閱讀資料，亦可把動畫和影片等放進屏幕裡，提供比展板更多元化的資訊。

新科技亦讓我們可以更仔細地研究藏品，而且把這些過往無法獲得的資料展示給觀眾。例如我們利用了無人駕駛航拍機，為能量穿梭機拍攝照片和短片。能量穿梭機是香港科學館一件非常大型的展品，跨越四個樓層，是世界上同類型展品中最大，可想而知以前要接觸這些仔細部位是多麼的困難。

我們可以利用三維立體掃描及三維打印技術，複製文物或其他展品，讓觀眾觸摸及與這些複製品互動，毋須再擔憂會損壞原物，亦拉近觀眾和展櫃內物品的距

visitors to ride a similar bike and travel around the Palace Museum, like what Puyi had done.

We have planned to install this new interactive exhibit sometime next year. It is an immersive theatre combining motion sensing and feedback technology. Equipped with multiple motion sensors, this technology allows visitor's own physical activity to contribute to the flow of the storyline, while the responsive technology encourages them to continue to move.

Well, if you find the above too exciting or tiring, and you just want to read the information in a more peaceful way, new technologies can display the information in more interesting ways, for example, by using multi-screen projections.

This multi-screen projection and the multimedia programme was developed by the Hong Kong Museum of History for an exhibition on the First Emperor of China. It had made use of 32 projectors to create an immersive effect that took the visitors back to the terracotta army pit 2 000 years ago. We can also use the technologies of projection mapping on 3-D objects. This multimedia programme allows visitors to have an understanding of the afterlife journey of a woman, whose mummy is one of the star exhibits of our Eternal Life exhibition, before they go to see the artefact.

Organic Light Emitting Diode, OLED, is a new display technology that is brighter and thinner with better contrast and more energy efficiency. We have used OLED panels in the Eternal Life exhibition and found that the effect was very good. This type of panels is virtually transparent, so it allows you to read the information and see the objects at the same time. We can also put animations and videos in it, and give much more information than what graphic panels can do.

New technologies also enable us to study our collections in greater detail and give our visitors some information that was not available before. We have used this unmanned aircraft to take photos and videos of the components of our Energy Machine. This Energy Machine is a huge exhibit in the Hong Kong Science Museum. Spanning over four storeys, it is the largest of its kind in the world. You can imagine how difficult it was to reach to those small details before.

3-D scanning and 3-D printing allow us to make replicas of historical artefacts. Visitors can now touch and interact with the replicas without damaging the original, and be more connected to the objects that are put inside the showcases. We can make prototypes of exhibits before



離。這些技術亦讓我們可以在製造展品前預先製作原型，又或是把所得的數據模型用在其他的展覽和節目中。

資訊科技讓我們可以更環保地收集觀眾意見。這個電子留言版是為「永生傳說」展覽而設計。有趣的是，原來觀眾喜歡透過圖畫而非文字留下他們的心聲，當中更不乏富有藝術性和創意的佳作，歡迎大家前往我們的臉書專頁欣賞。

現時許多創新的遊戲都利用了數碼科技。這個遊戲名為「美的比拼—埃及篇」，你可以先替自己拍照，然後打扮成古埃及人，電腦會採用古埃及的標準品評你的扮相。之後你可以下載照片，並透過社交媒體和朋友分享。

博物館未來還可以利用那些創新科技？

這是一種配備了「混合實境」新技術的特製眼鏡，它內置感應器、攝影機、處理器等多種儀器，把觀眾、物品和環境結合在一起，觀眾更可在虛擬的世界和構建出來的影像互動。或許有一天當你參觀科學館時，你會先獲得一副眼鏡，戴上以後，愛因斯坦便會出現和你打招呼，然後帶你四處參觀；又或許當你參觀故宮博物院時，溥儀皇帝會作為你的嚮導，向你細訴紫禁城內的辛酸。

對於那些在參觀博物館時，不想配戴或手持任何裝置的觀眾，可以考慮租借一個機械導賞員。她是由日本科學未來館研發的機械人，會在2020年於我們舉辦的一個機械人展覽中亮相，當然她還須再接受更多的訓練。

是否有點不可思議？但現實是，科技正在改變我們學習和溝通的模式，或許現時問題已不在於博物館應否引入科技，而是應該如何確保科技用得其所，能夠配合博物館的使命。我相信只要取得正確的平衡，科技可以令博物館的參觀經驗變得更吸引、更個人化、更投入，以及更有創意。謝謝各位。

they are fabricated, or we can use the digital models created from the scanning for use in exhibitions and other programmes.

Information technology also allows us to collect visitors' feedback in a more environmentally-friendly way. This e-message board was developed for the Eternal Life exhibition. It is interesting to see that most visitors preferred to leave messages in form of drawings rather than texts. Many of the drawings were indeed very artistic and creative. You may wish to go to our Facebook to have a look. Apart from messages, the data collected will also be useful for evaluation of exhibitions and future planning.

Digital technology also enables us to develop many different types of innovative games. This game is called Beauty Contest in which you can take a picture of yourself and dress up like an ancient Egyptian. We will then tell you how beautiful you are, of course, from the ancient Egyptian point of view. You can then download your image and share with your friends through the social media.

What's next?

This is a new kind of Mixed Reality device which combines sensors, cameras, processors, and so on into a special pair of eyeglasses to bring people, places and objects all together. You can even interact with the created images in the world around you. Perhaps one day when you come to visit the Science Museum, you will be given a pair of smart glasses. After wearing it, you will be greeted by Einstein who will show you around the museum. Or when you visit the Palace Museum, you will be able to meet Emperor Puyi who will tell you what life is like within the red walls of the Forbidden City.

For those who do not want to wear any headgears or hold any handsets when visiting the museum, they may wish to just hire a robot guide. She is Kodomoroid, a human robot developed by the National Museum of Emerging Science and Innovation of Japan. In fact she will be coming to Hong Kong in a robot exhibition that we will be holding in the year 2020. Of course, there is still much she has to learn.

This may be a bit beyond our imagination, but the fact is technology is changing the way that we are now learning and communicating. Perhaps the question is no longer whether technology should come into museums, but rather how we can ensure technology can support and fit alongside the museum's missions. With the right balance, I believe that technology can make the museum experience much more epic - an experience that is Engaging, Personalised, Immersive and Creative. Thank you.