

兩港青發明AR新裝置 以聲代畫助視障人士出行

New AR Device Created by Two Young Locals to Help the Visually Impaired Travel

AI Augmented Box - Paul Lee & Dennis Cheung

撰文 當文尼



想像一下，當有天你要出門，去一個完全陌生的地方，但你的視力變得模糊，看不清，只有一枝白手杖時，你能走多遠？目前全港約有17萬視障人士，他們每天需要依靠白手杖、導盲犬等輔助工具物穿梭鬧市，箇中苦況有苦自己知，但相應的問題卻不能忽視。兩位本地青年張梓軒（Dennis）及李力恒（Paul）就想到用創意科技，結合社會需要，令視障人士更方便出行，去新的地方，融入社會。

Imagine going out to a place you have never been, but your vision is blurry and all you have is a white cane. How far do you think you can go? There are about 170,000 people with visual impairment in Hong Kong. They rely on the assistance of a white cane or a guide dog to get around the city daily. They come across many obstacles in daily life, and no one should turn a blind eye to the situation. Dennis and Paul, two young locals, thought of using innovative technology to make it easier for the visually impaired to travel and get involved in society.

「路漫漫其修遠兮，吾將上下而求索。」屈原在《離騷》中寫下的這一句，除了激勵後人努力求道，更彷彿道出不少視障人士心聲。對他們而言，即使依靠白手杖或導盲犬出行，每一步都舉步為艱，每一級樓梯也充滿挑戰，甚至風險。當獨立出行已非易事，要自主生活更可謂天方夜譚。Dennis及Paul有見及此，運用AR（擴增實境）技術方便視障人士出行。

「AR的定義是，在現實世界中，每個人在physical reality（物理現實）中，給一些新資訊給他們，令他們在行為中變得更好，生活更加smart。而對視障人士來說，AR又是甚麼呢？我們認為是audio augmented reality（語音擴增實境），以此幫助他們出行……在這個現實世界中提供更豐富的資源，達到他們想做的事情。」Paul說。

目前視障人士主要在白手杖或導盲犬等工具輔助下出行，但Paul留意到，訓練員訓練導盲犬時有機會被拉至撞柱，思考有沒有更完善方法輔助視障人士。同時資料顯示，導盲犬數量未能滿足視障人士需要，他希望能夠研發更普及、更便捷的工具，助視障人士出行。於是，二人以創意科技結合社會需要，研發一個獨立、輕巧裝置，助視障人士輕鬆出行，探索城市。

此AR不同彼AR

他們開發的獨立裝置結合相機模組及人工智能技術，會實時分析路面情況，指示視障人士步行的方向和步距。功能類同智能手機的地圖導航，但更為貼心。「一條路線，不是每條路線轉彎位都是90度直角，所以我們用一個新方法，就是時鐘的方向，例如十點鐘方向，行多少步，這樣更準確。」裝置需連結手機應用程式，視障人士只需提前設定目的地，就能起程探索新的路向。

希望能夠研發更普及、更便捷的工具，助視障人士出行。

電腦人搞創科

接觸社福機構了解盲人所需

Dennis及Paul兩位二三十歲的年青人，均是電腦科學系出身，現從事有關人工智能技術的創科工作。其中Paul更有碩士及博士學位，有一次他為了解AR技術如何應用在視障人士上，到訪有關組織，與視障人士訪談三小時，萌生開發視障人士產品的興趣，希望幫助他們。

“On and on stretched my road, long it was and far. I would go high and low in my search.” While poet Qu Yuan encouraged people to strive hard for the truth in his poem Li Sao, the poem somehow also spells out the difficulties of the visually impaired. To them, every step they take with the help of a white cane or a guide dog is arduous. Every step on the staircase is a challenge and a risk. Travelling independently is a strenuous task, not to mention living independently. In view of that, Dennis and Paul came up with the idea of using augmented reality (AR) to help the visually impaired travel.

IT Experts Learning about the Needs of the Visually Impaired through Social Welfare Organisations

Dennis and Paul, who are in their twenties and thirties, both graduated with a Computer Science degree. They are now working in the field of artificial intelligence (AI) in the innovative technology industry. Paul also has a Master's degree and a PhD. In order to understand how AR technology was used to help the visually impaired, he once visited a related organisation and spent three hours interviewing people with visual impairment. The experience inspired him to develop products that could help them.

Paul pointed out, “The definition of AR is to add new information to the physical reality to make people's lives smarter and easier. So, what is AR to the visually impaired? We believe it would be

adding information to their audio augmented reality. This can help them travel and do what they want to do.”

The visually impaired mainly travel with the assistance of a white cane or a guide dog, but Paul noticed that even guide dog trainers were sometimes dragged into railings during training. He wondered if there was a better way to assist the visually impaired. Statistics also showed that the number of available guide dogs could not meet the demand. He hoped to develop a more popular and convenient tool to assist the visually impaired in their travels. Therefore, the duo used creative technology to meet social needs by developing a self-contained and lightweight device to help the visually impaired travel and explore the city.

Not the Usual AR

The stand-alone device they developed integrates a digital camera and AI technology. It analyses the road conditions in real-time and guides the visually impaired to walk in the right direction and distance. The function is like the map navigation on a smartphone, but with a more thoughtful touch. “Not every turn in a route is a 90-degree turn, so we use a different method, which is to give the clock position. For example, the instruction would ask the user to take a certain number of steps towards the 10 o'clock direction. This is more accurate.” The device is connected

貼心設計背後，其實是多番改良和調整。一開始設計時，Dennis及Paul計劃將裝置安裝在導盲犬及手杖上，但收集多個用家試用意見後，發現裝置難以固定在導盲犬身上，亦會加重手杖重量，影響視障人士以手杖接觸外界的觸感。於是，他們決定改良成獨立裝置，視障人士只需將裝置掛在身上，或夾在衣領或口袋上，便能使用。而裝置只有一個按鍵，方便視障人士分辨前後左右。「和視障人士聊天，了解產品的設計、形狀，按鈕應放在哪裡，（按鈕）可以多大，甚至多少粒按鍵等，從而慢慢了解用戶理想中產品是怎樣。」

Dennis及Paul稱，曾安排視障人士測試裝置，由金鐘添馬艦公園步行至中環碼頭，結果全部都成功抵達終點，即使有人中途行錯路，裝置亦能自動指引正確路徑，沒有愈行愈遠。「起初以為他們學習新事物時，需要花很長時間，或者很不適應。但最後發現，大部分視障人士均表示，產品其實蠻容易使用，可以很快掌握到新的科技。」他們認為裝置的準確度達七、八成，但現階段只適宜輕度至中度視障人士使用，待研究更成熟，才會推出全盲人士的產品。

定價不敢太進取 助弱勢惠老人

根政府統計處2014年資料，本港有約17萬4千多位視障人士，當中只有一成從事經濟活動，而七成每月收入低於15,000元。Dennis及Paul認為，社創科技要從人、從用家角度出發，若裝置推出市面，定價不能進取，只會介乎200至300美元（即約1,550至2,300港元），務求普及使

用。「做一個便宜得來、又用得著的產品，是我們希望做到的。」

未來，他們希望集中改良及微調裝置，令更多人受惠，除了視障人士外，受眼疾困擾的人及長者都能使用。「在應用在老人家身上時，可加入軟件特色，無需再做一個硬件。而這個軟件可以提醒他們回家，有一些定位功能，解決長者走失問題。」雖然產品仍在開發階段，但千里之行，始於足下，只要開始了行動，那怕路遠崎嶇，總有到達目標的一天。



to a mobile app, so the visually impaired can simply set up a destination in advance and set off to explore.

The thoughtful design is the result of repeated improvement and adjustment. In the initial design, the device was to be attached to a guide dog or a cane. However, users commented that it was hard to secure the device on a guide dog and the device added weight to the cane, affecting the sense of touch. Therefore, they modified their design so that the user can wear the device; it can be strapped on, carried in the user's pockets or attached to their collar. There is only one button on the device for easier handling. "We chatted with the visually impaired in the design process. We gathered opinions about things like the shape of the device, as well as the position, size and number of buttons. It allowed us to know more about the users' preferences."

Dennis and Paul said that they once arranged people with visual impairment to test the device by walking from Tamar Park in Admiralty to the Central Pier. All of them reached the destination successfully. Even though some of them made a wrong turn, the device helped by guiding them back to the right path. "At first, I thought that it would take a long time for the visually impaired to learn something new or that they would find it hard to adapt to the device. But in fact, most of them could grasp new technology quickly and

they found the device easy to use." Dennis and Paul believe that the accuracy of the device can reach 70% to 80%, but it is only suitable for mild to moderate visually impaired people at this stage. A product suitable for the blind will be launched when the research is more mature.

Priced Reasonably to Help the Underprivileged Elderly

According to figures of the Census and Statistics Department in 2014, there are more than 174,000 visually impaired people in Hong Kong. Only 10% of them are economically active and 70% have a monthly income of less than \$15,000. Dennis and Paul believe that social innovation technology should be user oriented. Thus, the pricing of the device should be reasonable; it is set between 200 to 300 US dollars (HKD 1,550–2,300) to be more affordable. "We want to make a product that is both affordable and practical."

In the future, they hope to focus on improving and fine-tuning the device so that it can be used by not just the visually impaired, but also people with eye diseases and the elderly. "We can modify the software to suit elderly use while keeping the hardware of the device the same. This software could remind them to go home and it would come with GPS to prevent them from going missing." The product is still in development but a journey of a thousand miles begins with a single step. When there is a will, no matter how difficult the journey is, there is always a way.