

2019全國大學校院數位人文大數據學生競賽

作品名稱：社區活動數位人文與大數據的應用

南開科技大學、中山醫藥大學、亞洲大學、中台科技大學 學生團隊



競賽指導暨補助單位：教育部資訊及科技教育司

競賽主辦單位：國立政治大學

競賽協辦單位：教育部數位人文創新人才培育計畫





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詳連結：全文數位影音版 <https://youtu.be/7i2xUNol8Z8>

or <https://drive.google.com/open?id=1sIsM-CF5UzBJV9uu6VVtDKAMby39ZH1m>



團隊參與各項社區活動與社區長者互動。



動機



1. 科技是為人服務，適當的應用數位科技，也能用來體現社區人文，提高長者社區參與的意願，促進社區長者在地健康老化。
2. 本作品依據團隊在社區關懷據點的活動參與，並提供前期作品供長者試體驗(見圖1)，所觀察到的現象例如：
 - 如何促進長者參與活動意願。活動中身體不適要如何即時發現。
 - 現有APP均為年輕族群設計，造成社區長者使用上的障礙。
3. 團隊構思如何運用數位影音、雲端、大數據的科技，來體現在地人文、降低社區志工負擔、方便長者操作介面的解決方案及延伸思考。

圖1前期作品與長者體驗交流



年齡不是問題，心情輕鬆，日子就快活。

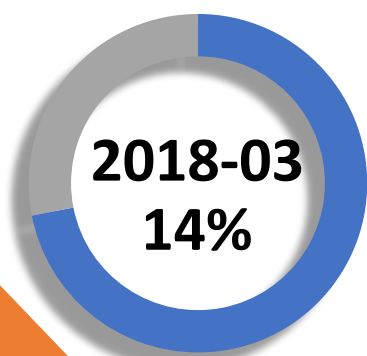


社區室外活動影音剪輯 詳連結網路硬碟

<https://drive.google.com/open?id=1XwMtW1nDSodbAUn2iF5k9yHxP0005Y9A>



背景



1. 人口老齡化迅速已成為全球性問題。巨大的醫療費用也成為各地政府的負擔。休閒活動對於建構健康老化，在身體健康、心理健康和社會關係至關重要¹。
2. 內政部戶政司²統計臺灣65歲以上長者在2018年3月已超過14% (約331萬人)進入高齡社會，經建會預估在2025年將達20%，進入超高齡社會，人口老化問題嚴重。(見圖2)

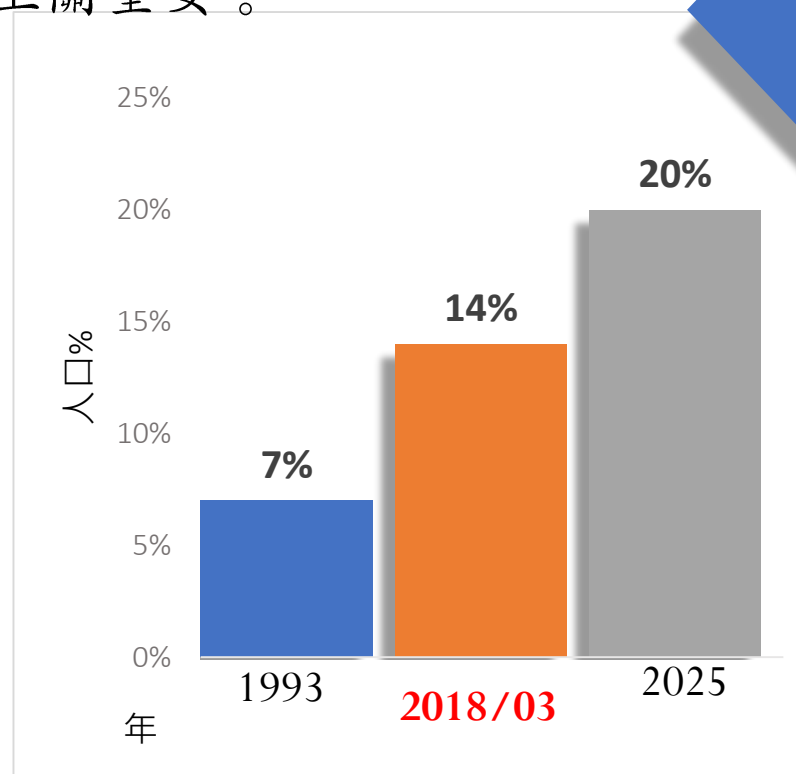


圖2.臺灣65歲以上人口統計圖

組織人力資源 跨校、跨區、跨領域的團隊架構

- 本團隊由不同縣市、不同領域專長的四位老師跨校指導。
隊員也是來自四所大學不同科系。

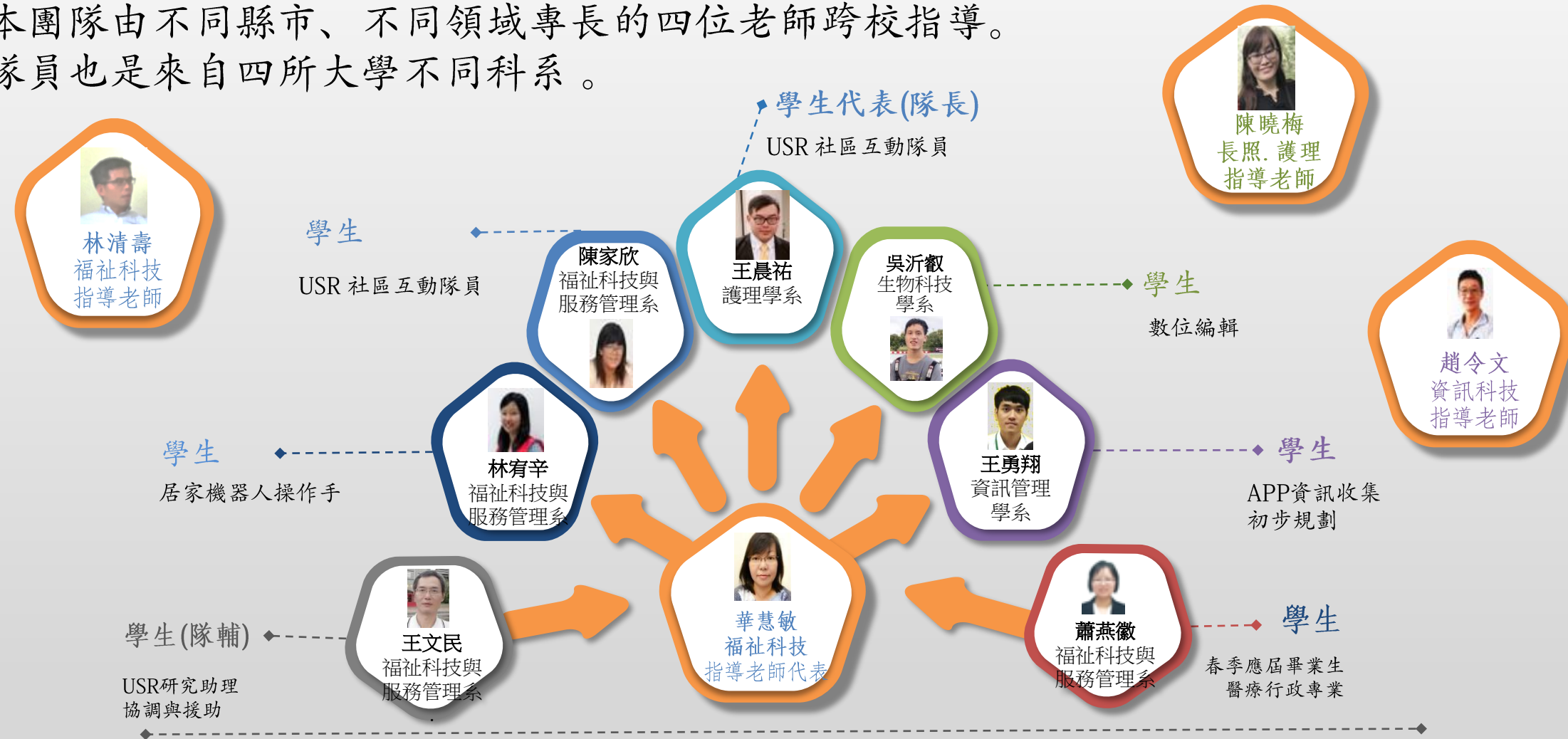


圖3.社區關懷與休閒活動數位人文的應用人力資源架構圖

團隊參與社區休閒活動

1. 本團隊參與教育部大學社會責任USR計劃，在社區關懷據點，透過休閒活動與長者們互動交流。(見圖4.)
2. 社區關懷據點的各種休閒活動都很有特色，別具用心，充滿陽光活力，長者們即使坐輪椅也會走出來，促進長者健康老化。(見圖4.5)



圖4.團隊與社區長者互動交流圖



圖5.社區長者室外活動圖

服務與觀察

團隊參與社區休閒活動影音剪輯

3. 透過參與社區休閒活動，及前期作品試體驗的影音剪輯，從服務中觀察各種現象。(見圖6.)



圖6.社區活動影音剪輯 詳連結

<https://drive.google.com/open?id=1qiAYrPfcQbEMDwNDhgvV4O44NgeFHXW->



4. 從活動中觀察到的各種現象、問題與挑戰，探索解決方案及延伸思考。

表1. 問題及解決方案團隊討論表

NO	現象或問題	解決方案	備註
1	面對鏡頭長者表現賣力，不怕陌生人。	透過影音突顯，增加長者心理滿足感。	
2	各社區都有特色服飾，如山地原鄉味服飾，且演出充滿活力。	此各社區珍貴特色片段，團隊可協助編輯，也可透過網路介紹社區人文。	
3	有些社區有手工藝產品，或特色在地農產加工品。	協助社區編輯產品影音圖檔，草擬網路行銷。	
4	活動中身體不適要如何即時發現。	要在旁仔細觀察，也可以配戴心率健康手環試試。	
5	現有的手機操作介面煩瑣，不適合老人用怎麼辦？	試試團隊來撰寫一個適合老人用的APP。	須尋找有開放API、SDK的廠家
6	手環手機只能警示個人，若無查覺怎麼辦？	APP可加入警示指定的聯絡人。	需設立伺服器
7	警示時，長者家人不在身邊怎麼辦？	若聯繫不上應尋求鄰居查看，或考慮用可以遠端遙控的居家機器人勘查。	
8	長者能接受機器人嗎？	先去借用，帶到社區給長者試體驗。	
9	長者與機器人雞同鴨講。	可建議機器人廠家未來聲控應考慮方言。	



2019築夢構想



● 為預防活動中長者的體能過度消耗而身體不適，參考衛福部「社區發展季刊161期：遠距健康照護介入社區關懷據點之探討」³的建議事項。計劃以使用含心率、血壓偵測、RFID的穿戴式健康手環，連結Android 智能手機或智能居家機器人，以Android Studio撰寫適合中高齡長者使用的APP程式。

● 依高齡長者操作特性，設計將按鍵圖像化、加大簡化，階層不超過二階，以方便長者操作。協助長者在社區關懷據點或居家做健康管理。(見圖7)



圖7.智能居家機器人APP開啟圖

2019築夢構想 穿戴式健康手環與智能手機的應用構想1

1

本團隊於ISG2018 (ISG's 11th World Conference of Gerontechnology) 及 I3S2018 (6th International Symposium on Sensor Science)國際研討會發表時，在試體驗意見回饋中分別有：76%、86%的長者能接受休閒活動與心率健康手環的搭配使用(見圖8、詳附件)。

2

為了解手環心率偵測誤差範圍，至醫院實地比較，結果：手環心率偵測數值 $> 2\text{BMP} <$ 醫院醫療用設備的數值範圍。(見圖9)



圖8.國際研討會發表



圖9.心率偵測比對

2019築夢構想 穿戴式健康手環與智能手機的應用構想2

3

為社區每日簽到避免不識字的尷尬，及同時段到場的擁擠(見圖10)，擬導入RFID與讀卡機，社區志工也可透過雲端匯整資料，對未到場長者，實施電話關懷或居家訪視。

4

活動模式鍵用以選定心率警示上下限或預設值。(見圖11)



圖10.日常簽到與心率血壓量測



圖11.活動模式設定



2019築夢構想 穿戴式健康手環與智能手機的應用構想3

5

心率實時偵測超標時，手環震動、手機圖像鈴聲警示，並示警求助緊急聯絡人，預防昏厥、猝死、孤獨死。（見圖12）

6

社區影音鍵在於突顯社區長者的社會參與及家人朋友分享，將分散的相片或錄影匯集在一處，方便操作。（見圖13）

7

設定鍵可輸入帳號個資、緊急聯絡人，及其他功能顯示。



圖12.心率超標警示



圖13.社區影音



2019築夢構想 穿戴式健康手環與居家機器人的應用構想1

1

Android智能居家機器人，螢幕尺寸與手機不同，畫面做橫向調整，以符合螢幕方向。(見圖14)

2

當居家長者手環偵測到心率超標發出警示時，外漂的緊急聯絡人可透過遠端操控機器人(見圖15)，勘察長者情況，及時應急呼救求援，預防長者跌倒、昏厥、猝死、孤獨死。

3

當手環心率超標發出警示時，在家中的親人也可以使用遠距醫療偵測器材複檢確認。(見圖16)



圖14.橫向調整畫面

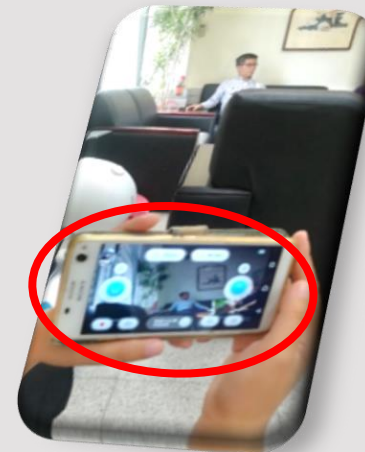


圖15.遠端遙控機器人畫面圖



圖16.遠距醫療偵測器材

2019 築夢構想 穿戴式健康手環與居家機器人的應用構想2

4



若能使用地方語言聲音控制，會更方便長者操作使用。(見圖15)



圖17.機器人接受程度體驗

機器人接受程度體驗 詳連結

<https://drive.google.com/open?id=1COKNb1VyqRS75ezhMHFqwgN8Yak1Hgh3>

社區人文數位影音的應用構想



1



台灣老人臨終前臥床時間平均為7年；北歐國家只有2個月⁴，這使照護醫療費用負擔沉重。

2



導入社區各種休閒活動影音圖像直播或下載，供長者分享家人及朋友，增加長者心理滿足感及社會需求，希望能提高長者社區參與的意願，促進長者健康老化，即使坐輪椅也願意走出來。

3



社區人文數位影音存到伺服器，減少佔用手機內存；手機APP匯整社區數位影音至一個觸發鍵，可方便長者或家人觀看、下載、分享⁵。

4



可以設定不同權限，例如社區志工可存取、刪除。長者只能讀取、下載，以防止長者操作失誤。





5



圖18.手環偵測數據資料圖

RFID及心率、血壓等手環偵測的數據資料(見圖18)，透過伺服器大數據分析匯整，可供社區關懷據點了解長者參與社區活動的多寡，也可供遠距健康照護下載參考。

6

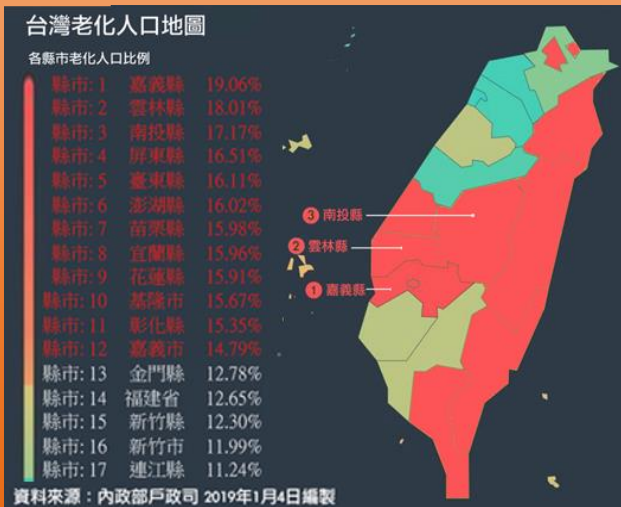


圖19.台灣老化人口地圖

資料來源：內政部戶政司 2019年1月台灣人口統計資料

內政部戶政司統計資料²，臺灣65歲以上長者截至2018年12月底，共計3,433,517人，佔總人口14.56%，台灣已經是「高齡社會」，南投在臺灣老化縣市排名第3(見圖19)。由此可見數據資料量之龐大。





1



本作品之數位影音構想，是以社區人文為背景，長者為主角，來解決長者使用影音傳播的障礙，體現社區人文，促進長者社會參與意願。

2



本作品之健康手環與智能手機應用構想，是為預防活動中長者的體能過度消耗而身體不適，並設計方便長者使用的操作介面。

3



本作品之健康手環與居家機器人應用構想，是前項構想的延伸思考，並善用遠端操控機器人勘察情況，預防跌倒、昏厥、猝死、孤獨死。

4



偵測數據資料可運用雲端、大數據的科技，以協助志工資料匯整，降低社區志工負擔。進而供遠距健康照護下載參考，為長者提供健康管理建議。



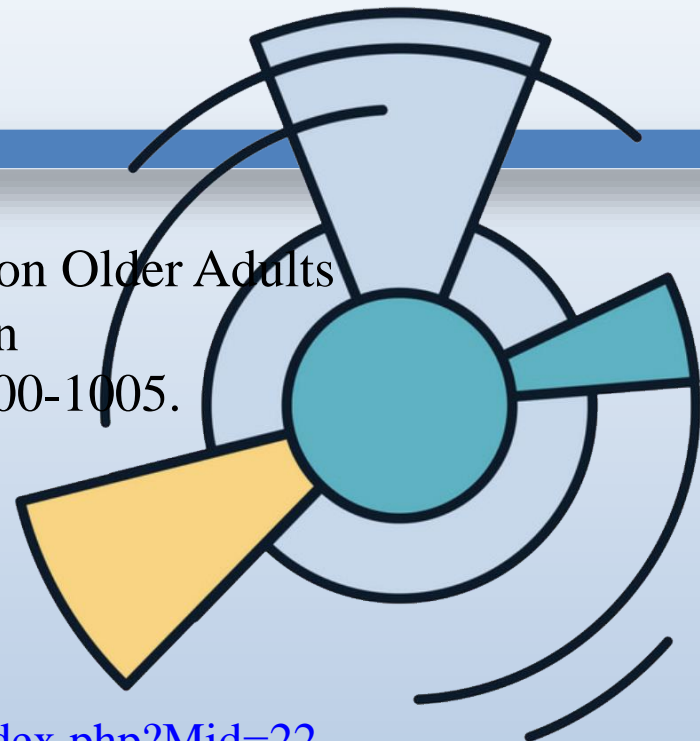
再看一次！

- 這是團隊要做此專題的主因之一。
- 及時發現長者跌倒、昏厥，預防長者猝死、孤獨死。
- 幸福快樂還是要注意安全。



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- 感謝南投草屯鎮碧峰社區、土城社區、加老社區及其他社區，各位幹事及長者們，能與團隊成員一起腦力激盪，並參與各項活動及支持各項作品試體驗。



附件一 團隊整體預定方案

台灣社區發展之人文關懷與服務

Humanistic Care and Service in Taiwan Community Development.

Taiwan has entered a stage of aged society in 2018, and its population is rapidly aging. The population over 65 has reached 14%, exceeding 3.31 million.

1. Taiwan community care and services to promote the participation of the elderly in the society, to avoid loneliness at home and to ease the loneliness of the elderly.
2. Volunteers are enthusiastic in their service to revitalize the quality of life of the elderly and inspire the elderly to face the elderly environment.
5. The community advocates ecological farms, reduces pesticides and fertilizers, and attaches importance to new environmental protection trends
6. In response to the global warming and the trend of international car-free cities, the community promotes bicycle leisure and develops green transportation.
7. Community folk custom activities, the elderly leisure sports have vitality, and the favorable culture is passed on to future generations.
8. Youth participates in community services, healthy and aging, and community development has a future.
3. Community traditional folk festivals, special foods and international sharing.
4. Community training organic vegetable and fruit planting to ensure food safety.

1.穿戴式裝置與休閒代步車
活動之可行性評估

Green Tech 國際賽佳作

福祉科技產品佳作

(ISG2018)研討會

二張專利核准證書

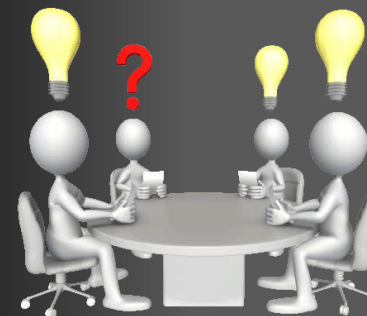
2.室內發電健身車+
應急供電模組
及全景攝影+VR播放
之應用

(I3S2018)研討會
台灣能決賽入選獎
福祉科技產品金牌

3.穿戴式裝置與智能
設備應用+APP撰寫

4.未來規劃社區營造及
非營利事業服務管理

現階段進行




附件二前期執行成果1



The "Grandma, Lets ride a bike to see clouds ! " is a vision of the team.



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Integrated design of smart leisure electric bicycle for middle-aged adults

H.M. Hua, W.M. Wang, C.Y. Wang, Y.R. Wu, P.H. Chen
Full text PDF (Download count: 86)

Keywords : smart health bracelet, leisure heart rate monitor, electric leisure folding bicycle

H.M. HUA, W.M. WANG, C.Y. WANG, Y.R. WU, P.H. CHEN. Integrated design of smart leisure electric bicycle for middle-aged adults. Gerontechnology 2018;17(Suppl):94s; <https://doi.org/10.4017/jg.2018.17.s.092.00>

Purpose: Aging population has become a global issue among whole world countries. Medical cost also becomes a huge burden for many countries as well. However, leisure activities have been regarded as an important relevance to build healthy aging in biological health, mental health and social relationship^{1,2}. It will help middle-aged adults (or even older adults) willing to participate in recreational activities with suitable leisure mobile tools³. A prototype of power recycling generator on older adult scooter was designed by our team in 2017. Through the power system conversion of this prototype, the battery in parallel was able to extend the battery life. It improved the outdoor mobility for older adults. And thus, it also enhanced their willingness to participate in community activities. More smart leisure issues were concerned and integrated in this study. **Method:** An orange 14-inch electric folding bicycle with highest speed 35Km/h was designed as control group (Figure 1). A red 14-inch electric folding bicycle with 3 level switching control speed limit (30, 25, 20 Km/h) was designed as experimental group (Figure 2). For the activity concerned, a cell phone rack, rear storage bag and bicycle cushion were integrated and adjusted for middle-aged adults (Figure 3). A smart heart rate detection bracelet was paired with a smart phone to detect and monitor heart rate during leisure activities (Figure 4). Thirty middle-aged adults participated in the test. **Results & Discussion:** 83.33% of the testers agreed that riding electric folding bicycles helped reduce the psychological stress. 86.67% of the testers agreed that 14 inches bicycles are more suitable and safe for Chinese middle-aged adults to be able to touch the ground with both feet. 93.33% of the testers agreed that electric bicycles assist and prevent excessive physical exertion. 86.67% of the testers preferred a rear storage bag rather than in the front. 76.67% of the testers agreed that a smart heart rate detection bracelet paired with a smart phone was suitable for leisure activities. For smart leisure activities in the future, a smart app will be implemented for middle-aged adults to set up alarms on the heart rate bracelet if an abnormal heart rate is detected. Alarms on the heart rate bracelet would be connected to the smart phone and sent out to the leisure teams and/or family.

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Keywords: smart health bracelet, leisure heart rate monitor, electric leisure folding bicycle
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Figure 1. A prototype design in 2017




Figure 2. Control group




Figure 3. Experimental group




Figure 4. Smart heart rate detection bracelet

南開科技大學 福祉科技與管理系

中、高齢智能休閒代步車整合設計試乘回饋記錄表

或恩您！協助試乘體驗，讓我們整合設計更加實用完善。 2018年元月12日

性別	年齡	A組折疊車 無裝置	C組折疊車 裝置心電手環	E組折疊車 裝置心電手環	備註
男	65	使用電動折疊車 14吋折疊車 14吋折疊車 14吋折疊車	14吋折疊車 14吋折疊車 14吋折疊車	14吋折疊車 14吋折疊車 14吋折疊車	
女	65	使用電動折疊車 14吋折疊車 14吋折疊車	14吋折疊車 14吋折疊車 14吋折疊車	14吋折疊車 14吋折疊車 14吋折疊車	



4輪折疊車試乘



20吋運動小摺疊車試乘



14吋折疊小摺疊車試乘



14吋折疊小摺疊車試乘



心電手環試乘

- 1) 83.33% of the testers agreed that riding electric folding bicycles help to reduce the psychological stress.
- 2) 86.67% of the testers agreed that 14 inches bicycles are more suitable for Chinese middle-aged adults to touch ground with 2 feet for safety concern.
- 3) 93.33% of the testers agreed that electric bicycles assist and prevent physical exertion.
- 4) 86.67% of the testers agreed that a rear storage bag is better than in the front.
- 5) 76.67% of the testers agreed that a smart heart rate detection bracelet with smart phone are suitable for leisure activities.

For smart leisure concerned in the future, a smart APP will be implemented for middle-aged adults to set up smart alarms on the heart rate bracelet if any heart rate abnormal happened. Alarms on the heart rate bracelet would be connected to the smart phone and sent out help to leisure teams or family.



附件三前期執行成果2

CONFERENCE PAPERS FEED GROUPS ABOUT NEW SUBMISSION

I3S 2018 6th International Symposium on Sensor Science (I3S 2018) and 4th SPINTECH Technology Thesis Award

6-8 August 2018, Kenting, Taiwan

6th International Symposium on Sensor Science and 4th SPINTECH Technology Thesis Award
06/08/2018 - 08/08/2018, Kenting, Taiwan

Tailored Nanostructures for CO₂ Gas Sensing Applications	Shravanti Joshi Ylias Sabri Lathe Jones Manorama Sunkara Samuel Ippolito	08 Jan 2018	Show
Automatic Blade Damage Inspection System Development for the Wind Turbine Application	Jui-Hung Liu Jien-Chen Chen Yu-Sheng Lu Wei-Chen Hsu	07 May 2018	Show
Creative design of the multi-purpose recreational sport bike for middle-aged and older adults	Wen-Min Wang Hui-Min Hua Chen-YU Wang Yi-Rui Wu	02 Jun 2018	Hide

The "921 earthquake" in Jihi hit Nantou in 1999. A long-time power outage after the disaster caused inconvenience to life, making the night environment even more alarming. This study aimed to design an electric bicycle as an indoor power generation exercise one. This study also tested the riding feedback at Nantou to propose the concept of adding emergency power supply module. To design and manufacture on testing and evaluating based on experimental methods. According to Faraday electromagnetic induction law, the wheel hub motor of an electric folded bicycle was modified to be switched between motors or generators. The bracket could be used to prop up the rear wheel and the hub wheel motor to be switched to the generator. Through the rectifying and boosting module, the super capacitor was connected to store electricity. Using a USB port, it could provide emergency power to low-power appliances as mobile phones and LED lighting. When the bicycle rear wheel speed was 25Km/h, 20Km/h, 15Km/h, the no-load voltage was corresponding to 21.1v, 17.0v, 12.2v. There were 25 middle-aged and older adults in total attended a riding test in Nantou. 96% of the testers agreed that LED lighting emergency power supply module, in the dark night of power outages, can reduce the psychological fear.

- 1) **84.00% of test riders agree that indoor exercise bikes can assist the elderly in training bicycles.**
- 2) **88.00% of test riders agree that indoor exercise bikes will help the elderly to do indoor sports.**
- 3) **96.00% of test riders agree that the LED lighting emergency power supply module can reduce the psychological fear of dark nights.**
- 4) **86.00% of test riders agree that the heart rate bracelet and smart phone are suitable for indoor exercise bikes and can prevent physical discomfort.**
- 5) **76.00% of test riders agree that the multifunctional leisure electric bicycle can accept the NT 1.8 million price/performance ratio.**



1. Conclusions of this design

According to the results of the trial ride experience feedback, the team will increase the function of recreational sports electric bicycles at the lowest cost, which can help middle-aged and elderly people train and use recreational sports tools, and at the same time, they can also meet the elderly's idea of preparing for emergency preparedness.

1. Main functions of exercise bike:

- 1) It can be used as a leisure travel electric bicycle when going out.
- 2) Turning off the battery power can be used as a recreational sports bike.
- 3) Using the support frame can be used as an indoor exercise bike to solve problems of shyness, fear, worry and training.
- 4) Connecting the emergency power supply module can be used as an indoor power generation exercise bike to prepare for emergency preparedness.

2. Emergency Power Supply Module Function:

- 1) The power generation exercise bike can maintain 20Km/h, and it can charge the super capacitor power storage device to the voltage of 0~40v in one minute.
- 2) After the super capacitor storage device is charged to a voltage of 40V, the USB direct-drive LED lamp can be operated for 59 minutes.
- 3) The super capacitor storage device can be charged to a voltage of 40v to fully charge the USB rechargeable flashlight. The flashlight can be turned on continuously for 2.5 hours.
- 4) After the super capacitor storage device is charged to a voltage of 40V, it can charge the mobile phone for 12 minutes each time, and it can exceed 50% for 12 times charging.
- 5) In the future, this study will conduct research on the use of recreational electric bicycles, leisure activities and rural community development, and planning for the elderly among senior citizens and senior citizens.

END ! Thank you.

Meet in the realization group next year.

南開科技大學、中山醫藥大學、亞洲大學、中台科技大學 學生團隊

