



National Cheng Kung University



IEEE 2017 Seminar

橘色科技：科技創新與人文關懷



王駿發 IEEE Fellow
大仁科技大學校長 成功大學講座教授

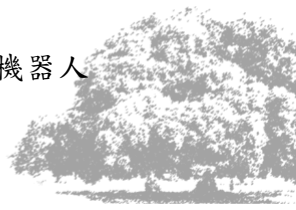


2017 6/8 於成功大學



Outline

1. 個人簡介：
 - 1.1 現職與經歷
 - 1.2 研究領域專長與研發成果
 - 1.3 專利申請經驗談
2. 研究創新案例：橘色科技的提出與推廣
 - 2.1 緣起：世界發展趨勢
 - 2.2 摸索：橘色科技發展歷程
 - 2.3 創新：水計算模式
3. 橘色科技創新延伸：創新AI智能家庭機器人
4. 結論與未來發展



台北橋淡水河邊：小時候生長的地方

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王駿發 教授

Prof. J. F. Wang

1.1 現職：

- * 大仁科技大學 校長
- * IEEE FELLOW, 1999-NOW
- * 成功大學電機工程學系 名譽講座教授

經歷：

- 2011-2012 IEEE Region 10 (The Asia Pacific Region)
Executive Committee, R10 Section/Chapter Coordinator,
- 2005-2007 國立科學工藝博物館館長,
- 2008- 2011 國立成功大學電機資訊科技及人文研發中心主任,
- 2009- 2011 IEEE Region 10 (The Asia Pacific Region)
Executive Committee, Industry Liaison-Coordinator,
- 2005-2009 IEEE Tainan Section, Chair,
- 1999-2004 國立成功大學工學院院長,
- 1997-1999 國立成功大學電算中心主任,
- 1990-1996 國立成功大學資訊工程研究所所長,
- 2003-2005 2010-2016 中華民國計算語言學會理事長



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王駿發 教授

Prof. J. F. Wang

1.2 研究專長：

- * 電腦語音辨識系統(Speech Recognition)
- * 電腦圖訊識別系統(Pattern Recognition)
- * 電腦語音對話系統(Spoken Dialogue System)
- * 電腦影音訊號處理系統
- * 人工智慧與機器人對話系統
- * 橘色科技 物聯網 大數據與整合創新產業

王駿發 教授

Prof. J. F. Wang

學術獎勵、榮譽事項：

- * IEEE Tainan Section, 2011 Best Service Award, 2011
- * 李國鼎科技與人文講座榮譽學者, 2009
- * 教育部教育文化專業獎章, 2007
- * 國科會傑出特約研究人員, 2005
- * 旺宏金矽獎評審團大賞(FIRST PLACE), 2002 ; 金矽獎一獎, 2001
- * 國科會傑出獎, 1990;1995;1997
- * 宏碁公司龍騰十傑, 1996
- * 中國工程師學會傑出工程教授, 1996
- * 資策會傑出資訊研究人員, 1991
- * 中國工程師學會工程論文獎, 2015
- * Gold Medal金獎, 2015 International Innovation and Invention Competition第六屆國際創新發明競賽-多功能耳機體溫計
- * Invention Education Medal發明教育獎, 2013韓國首爾國際發明展
- * 銀牌獎, 2013台北國際發明暨技術交易展

王駿發 教授

Prof. J. F. Wang

學術獎勵、榮譽事項：

- * 美律電聲論文獎-銅質獎, 2016 ; 優等獎, 2012
- * 中國工程師學會工程論文獎, 2015
- * ISAC 2010 Best Paper Award, 2010
- * THE ANZIIS 2003 CONFERENCE, Australia, Outstanding Paper Award, 2003
- * 宏碁第十二屆龍騰論文獎佳作, 1998
- * IEEE International Conferences, ICCAD-87, USA, Outstanding Paper Award(美國積體電路電腦輔助設計會議最佳論文獎), 1987
- * ERK 2015, Slovenia, Keynote Speaker, 2015
- * ICSPCC 2011, Xi'an, China, Keynote speaker, 2011
- * iCAST 2011, DALIAN, China, Plenary Speaker, 2011
- * TENOCN 2009, Singapore, Keynote Speaker, 2009
- * ICICIC 2009, Taiwan, Keynote Speaker, 2009
- * ITH-MSP 2006, California, USA, Keynote Speaker, 2006
- * WirelessCom 2005 HAWAII, USA, Keynote Speaker, 2005
- * PACLIC12, Singapore, Keynote Speaker, 1998

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Prof. J. F. Wang

學術期刊論文 累計共發表162篇學術期刊論文及342篇會議論文

- * Po-Yi Shih, Po-Chuan Lin and Jhing-Fa Wang, "Harmonic-based robust voice activity detection for enhanced low SNR noisy speech recognition system," IEICE Trans. Special Section on Smart Multimedia & Communication Systems, accepted at July 21, 2016. [EI/SCI, IF:0.65]
- * Ta-Wen Kuan, An-Chao Tsai, Po-Hsun Sung, Jhing-Fa Wang, Hsien-Shun Kuo, "A robust BFCC feature extraction for ASR system" . Artif. Intell. Research 5(2): 14-23 (2016)
- * Bo-Wei Chen, Yang-Yen Ou, Chun-Chia Kung, Ding-Ruey Yeh, Seungmin Rho, Jhing-Fa Wang, "Multivoxel analysis for functional magnetic resonance imaging (fMRI) based on time-series and contextual information: relationship between maternal love and brain regions as a case study" . Multimedia Tools Appl. 75(9): 4851-4865 (2016)
- * Yan-You Chen, Chung-Hsien Wu, Yi-Chin Huang, Shih-Lun Lin, and Jhing-Fa Wang, " Candidate Expansion and Prosody Adjustment for Natural Speech Synthesis using a Small Corpus," IEEE/ACM Trans. Audio, Speech & Language Processing 24(6): 1052-1065 (2016).
- * Shovan Barma, Bo-Wei Chen, Wen Ji, Seungmin Rho, Chih-Hung Chou, Jhing-Fa Wang, " Detection of the Third Heart Sound Based on Nonlinear Signal Decomposition and Time-Frequency Localization" . IEEE Trans. Biomed. Engineering 63(8): 1718-1727 (2016)
- * Chih-Hung Chou; Ta-Wen Kuan; Shovan Barma; Bo-Wei Chen; Wen Ji; Chih-Hsiang Peng; Jhing-Fa Wang, "A New Binary Halve Clustering Method and ERT Processor for ASSR System," IEEE Trans on VLSI system, Volume: 24, Issue: 5, Pages: 1871 – 1884, 2016. (SCI, IF:1.252)
- * Chung-Hsien Chang; Shi-Huang Chen; Bo-Wei Chen; Wen Ji; K. Bharanitharan; Jhing-Fa Wang, "Fixed-point Computing Element Design for Primary Operations of Speech Signal Processing," IEEE Trans. on Very Large Scale Integration (VLSI) Systems. Volume: 24, Issue: 5, Pages: 1993 – 1997, May 2016

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1.3 美國專利

1. Jhing-Fa Wang, Bo-Wei Chen, Jia-Ching Wang, Chia-Hung Chang "VIDEO SUMMARIZATION METHOD BASED ON MINING STORY STRUCTURE AND SEMANTIC RELATIONS AMONG CONCEPT ENTITIES THEREOF", U.S.A, Paten No.: US8,451,292 B2, 2013.May 28
2. 發明人：王駿發, 蔡安朝, 林偉光, "Direction Detection Algorithms For H.264/AVC Intra Prediction", U.S.A, Paten No.: US 8,204,114 B2, 2012.6.19
3. Jhing-Fa Wang, Chao-Ching Huang, Dian-Jia Wu "AUDIO SIGNAL SEGMENTATION ALGORITHM", U.S.A, Paten No.: US7,774,203 B2, 2010.08
4. Jhing-Fa Wang, Po-Chuan Lin, Li-Chang Wen, "METHOD AND SYSTEM FOR MATCHING SPEECH DATA", U.S.A, Paten No.: US7,707,032 B2, 2010.04
5. Jhing-Fa Wang, Jia-Ching Wang, Chen-Yu Chen "Video Summarization System And The Method Thereof", U.S.A, Paten No.: US7,613,365 B2, 2009.11
6. Jhing-Fa Wang, Han-Jen Hsu, Shang-Chia Liao, "IMAGE-CAPTURING DEVICE AND METHOD FOR REMOVING STRANGERS FROM AN IMAGE", U.S.A, Paten No.: US7,418,131 B2, 2008.08
7. Jhing-Fa Wang, Jia-Ching Wang, Tai-Lung Chen, Chin-Chan Chang, "SPEECH RECOGNITION SYSTEM", U.S.A, Paten No.: US7,266,496 B2, 2007.09
8. Jhing-Fa Wang, Po-Chuan Lin, Li-Chang Wen, "Partial Matching Algorithm for Sentence Retrieval", U.S.A, Paten No.: US 7,707,032 B2, 2005.
9. Jhing-Fa Wang, Chao-Ching Huang, Dian-Jia Wu, "Audio signal segmentation algorithm", U.S.A, Paten No.: US 7,774,203 B2, 2005.
10. Jhing-Fa Wang, Jia-Ching Wang, Yun-Fei Chao, Han-Chiang Chen, Ming-Chi Shih, "Method and apparatus for speech coding and decoding", U.S.A, Paten No.: US 7,305,337 B2, 2001.

累計獲得26項中華民國專利及10項美國專利

**"Partial Matching
Algorithm for Sentence
Retrieval" ,U.S.A, Paten
No.: US 7,707,032 B2,2005.**

**“Partial Matching Algorithm
for Sentence Retrieval” ,U.S.A,
Patent No.: US 7,707,032 B2,2005.**

今日新聞 2012年07月 31日

成大告蘋果 Siri疑侵犯語音專利



數位時代 2012年07月 31日

成功大學跨海怒告 蘋果Siri侵犯專利



民視 2012年07月 30日

SIRI侵權?成大教授跨海告蘋果

民視 2012年7月30日

新聞

SIRI侵權?成大教授跨海告蘋果



Siri侵權?成大教授跨海告蘋果

台南成大，控告美國蘋果公司的SIRI語音系統，涉嫌侵害成大電機系講座教授王駿發的研發專利，而且已經在上週五，向美國法院提出訴訟。成大跨海控告蘋果，打起難度極高的國際專利官司，而這也是首起國內大學向蘋果提出專利訴訟的案件。

聽到語音指令，機器人隨即跟著動作透過語音控制，電腦系統還能幫忙撥打電話，這套成大電機系講座教授王駿發，在2005年研發的語音辨識系統，有著多功能用途，還在美國申請專利，只是，同樣的功能，是不是在哪裡也看過？

成大表示，同樣的語音控制功能，卻在蘋果公司的SIRI語音系統上出現，涉嫌侵害成大講座教授王駿發的研發專利，上週已經向美國法院提出訴訟，打起跨海官司成大表示，縱使國際專利訴訟費用高，約在100-500萬美金之間，但美方律師認為相當有把握，成也為了捍衛權益，因此堅持告蘋果到底。(民視新聞報導、翁英修台南市報導)

2. 研究創新案例：橘色科技的提出與推廣



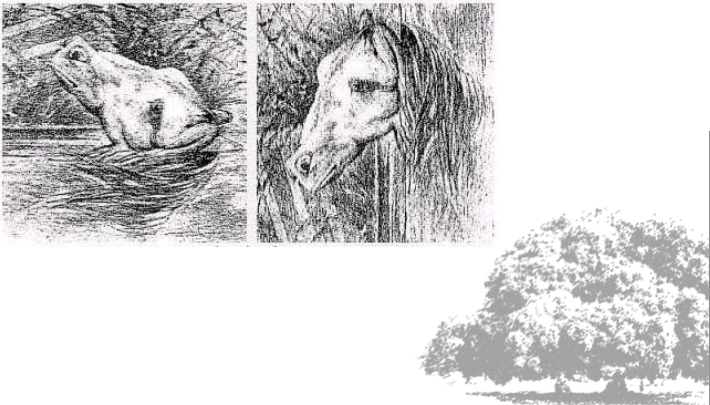
- (1) 橘色科技有別於綠色科技是一門新提出跨領域之科技研究，希望創造一道曙光，加強人本及人道科技之研究。
- (2) 橘色科技整合創新健康科技、幸福科技、關懷科技，統稱為橘色科技。
- (3) 是台灣原創也是世界原創，希望能進一步提升其創新、研究、發展，讓科技真正帶給人類健康、幸福與人文關懷。

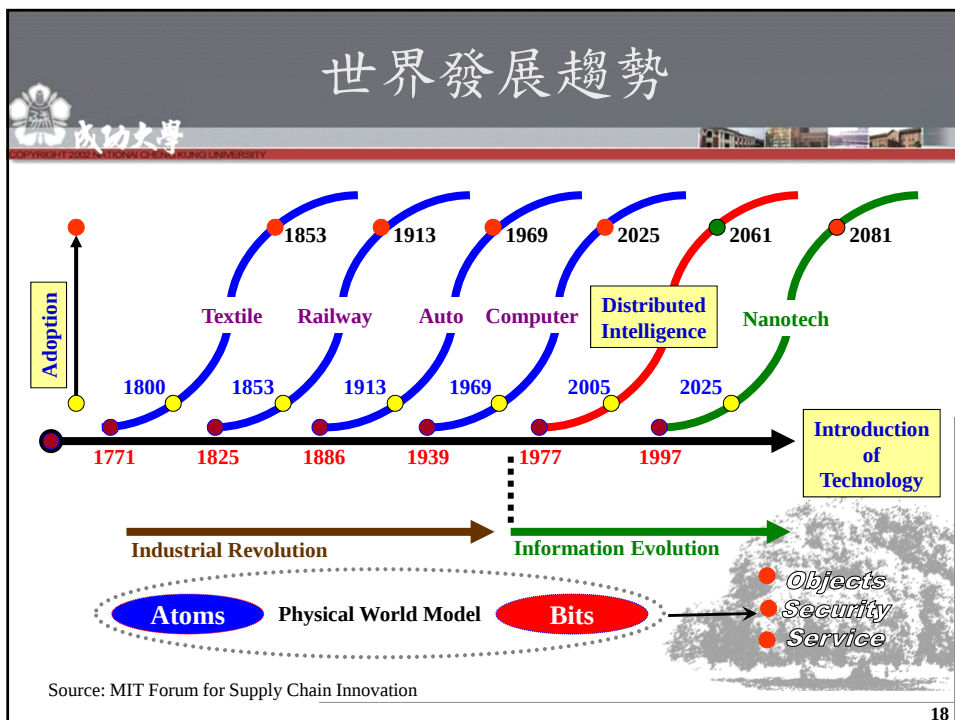


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2.1 緣起：Discovery





兩百年來科技的發展之優缺點

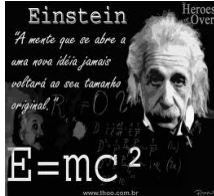

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優點：

兩百年來科技的發展，確實帶來了科學進步、經濟發展、交通便利、生活舒適

缺點：

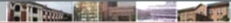
1. 地球暖化：過度耗費能源，排放過多CO₂
2. 造成物質化的結果及貧富懸殊等社會問題






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科技發展對人類的負面影響


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- ▶ 重名利，少文化
- ▶ 重物質，少精神
- ▶ 重工作，少健康
- ▶ 重金錢，少幸福
- ▶ 重個人，少關懷
- ▶



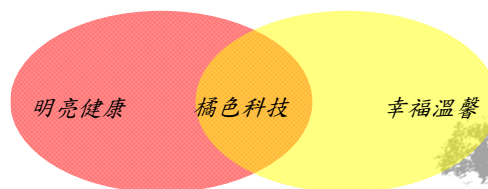
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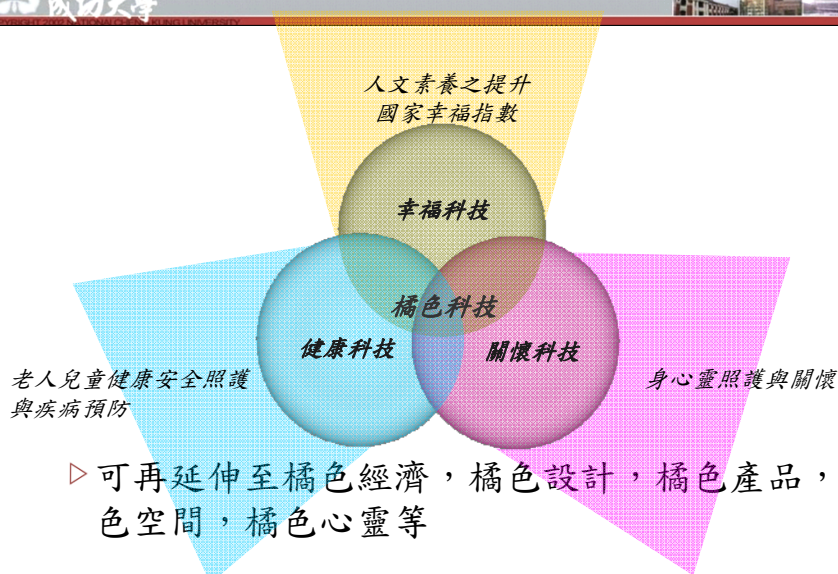
2.2 摸索：橘色科技發展歷程

- ▶ 橘色科技（Orange Technology），有別於綠色科技以環保為議題，其強調以人本人道關懷為中心，發展健康、幸福、人文關懷相關科技與系統產業為訴求。
- ▶ 橘色是紅色與黃色之組合，分別代表明亮健康，幸福溫馨。



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橘色科技研究範疇





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橘色科技 發展歷程

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- 2010. - 橘色科技健康照護博覽會論壇暨專題演講
- 2011. 2012
 - 橘色科技產業論壇暨博覽會-健康照護與幸福科技
 - 國科會跨領域橘色設計研究計畫
- 2012 - 台灣科學教育館辦理橘色科技序列演講
 - 出版橘色科技專書
 - 教育部五年五百億橘色科技攻頂計畫
- 2013 - 橘色科技國際會議(台南)
- 2014 - 橘色科技國際會議(西安)
- 2015 - 橘色科技國際會議(香港)
- 2016 - 橘色科技國際會議(澳洲)
- 2017 - 橘色科技國際會議(新加坡)



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巧遇屈原橘頌：有關橘子之頌辭



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- 后皇嘉樹，橘徠服兮。
- ▶ 橘啊，你這天地間的佳樹，生下來就適應當地的水土。
- ▶ 受命不遷，生南國兮。
- 你的品質堅貞不變，生長在江南的國度啊
- ▶ 深固難徙，更壹志兮。
- 根深蒂固難以遷移，那是由於你專一的意志啊。

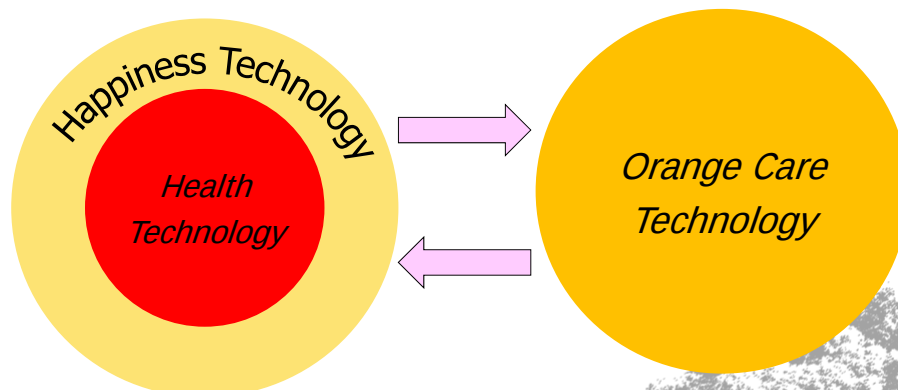


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橘色科技研究範疇

- ▶ (1) Health Technology (健康科技)
- ▶ (2) Happiness Technology (幸福科技)
- ▶ (3) Orange care Technology (關懷科技)
- ▷ 可再延伸至橘色經濟，橘色設計，橘色產品，橘色空間，橘色心靈等

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Detailed Scope of Orange Care Technologies



- ▶ Health & Security care for aged/senior People
- ▶ Health & Security Care for Children & Infant
- ▶ Care for the people in the disaster areas
- ▶ Care for the Low Income Family
- ▶ Care for the people with the problems of physiology psychology & spirit
- ▶ 人文素養之提升(三品，[語言的魔咒.ppt](#))



Detailed Scope of Orange Care Technologies



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- ▶ Health & Security Care for Children & Infant
- ▶ Care for the people in the disaster areas
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- ▶ Care for the people with the problems of physiology psychology & spirit
- ▶ 人文素養之提升(三品，[語言的魔咒.ppt](#))

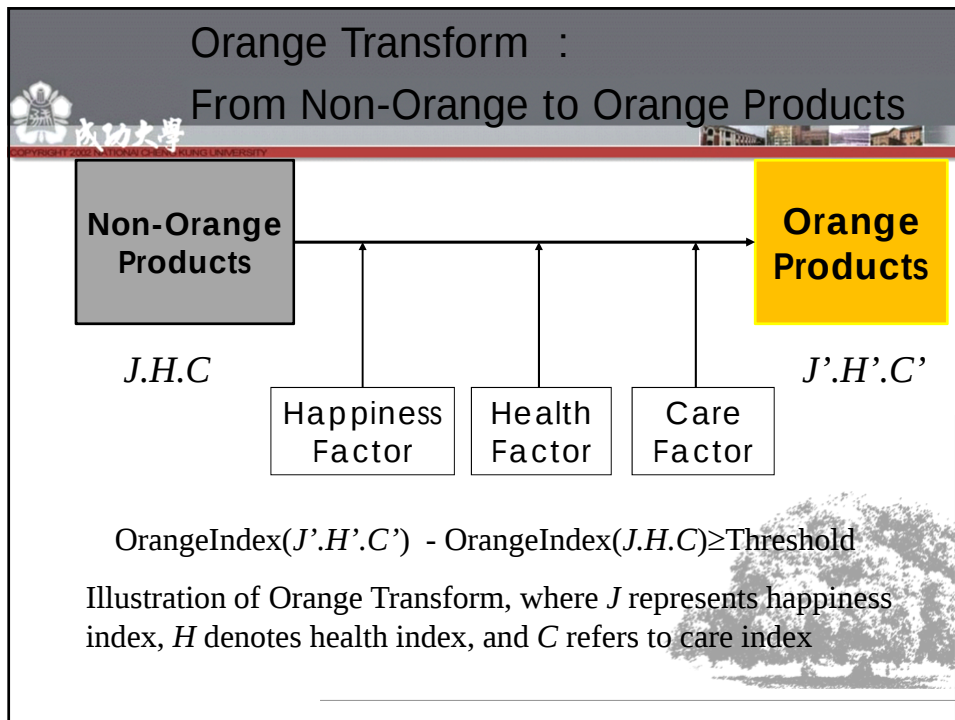


綠色科技與橘色科技的比較

	Green Tech	Orange Tech
Technology concern	Technology for Environment	Technology for Humanity
Key Element	CO ₂	H ₂ O
Design Items	-Energy saving -Environment Protection	-Health & Happiness Improvement -Orange Care for the people or Animals

Orange Transform:

- ▶ Any non-orange product or design can be converted into orange one as long as it adds three orange factors, including
 - ▶ happiness factor or index,
 - ▶ health factor or index,
 - ▶ and care factor or index.



2.3 創新：橘色科技水計算模式

- ▶ CO_2 is the Key element of **Green Technology**
- ▶ We can define H_2O being the key element in **Orange Technology**
- ▶ H_2O stands for :
 - H_2 : Health & Happiness
 - O : Orange Care



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老子與孔子對水之觀感

▶ 孔子在川上曰：



逝者如斯乎 不捨晝夜

▶ 老子說：



上善若水 水利萬物而不爭



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橘色科技之人本精神

橘色科技基於儒釋道思惟，發揮人本精神之價值

- ▶ 儒家思想：探討人與社會國家之關係
- ▶ 道家思想：探討人與自然之關係
- ▶ 佛家思想：探討人與心靈之關係



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橘色商機內涵與產值（今周刊報導）



3. 創新AI智能家庭機器人



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▶ 家庭機器人簡介

▶ Pepper

▶ Jibo

▶ Buddy



AI：人工智慧簡介



Cognitive Multimedia IC System Design Lab., National Cheng Kung University

▶ 仿生學:模仿自然生物

▶ 仿人學:

模仿人類具備

思考 聽說讀寫

追趕跑跳碰功能



AI：人工智慧簡介



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- ▶ 以電腦或機電整合裝置協助或代替人類解決日常生活或專業領域所面臨的問題。
- ▶ 其探索領域包括邏輯、機率和連續數學、感知、推理、學習和行動
- ▶ 通常以智慧型代理人來實現人工智慧之理念，可從環境中接收感知資訊，在以擬人化解決問題之眼算法來執行對應行動。



AI: 人工智慧內含



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- ▶ 問題與求解
- ▶ 知識表示方法
- ▶ 推理機制與專家系統
- ▶ 類神經網路
- ▶ 模糊控制
- ▶ 基因演算法
- ▶ 智慧型代理人
- ▶



人工智能的歷史

年代	20世纪40年代	20世纪50年代	20世纪60年代	20世纪70年代	20世纪80年代	20世纪90年代
計算機	1945 計算機 (ENIAC)	1957 FORTRAN語言				
人工智慧研究		1953 博弈論 1956 达特茅斯会议		1977 知識工程宣言	1982 第五代電腦計劃開始	1991 人工神经网络
人工智慧語言			1960 LISP語言	1973 PROLOG語言		
知識表達				1973 生產系統 1976 框架理論		
專家系統			1965 DENDRAL	1975 MYCIN	1980 Xcon	

*** 21世紀人工智能的發展 將結合
物聯網 大數據 機器人 作更前瞻性的發展

讓機器人變聰明，5大科技巨頭各擅勝場



Home Robot : Buddy (1/3)



Cognitive Multimedia IC System Design Lab., National Cheng Kung University

- ▶ Robot is currently being developed by French company Blue Frog Robotics
- ▶ Buddy can communicate with the family and navigate around the house
- ▶ Practical features include securing house and adjusting the thermostat
- ▶ Robot is also sociable and can read to youngsters and help with homework



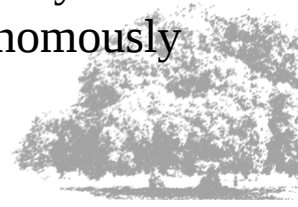
Home Robot : Pepper (2/3)



Cognitive Multimedia IC System Design Lab., National Cheng Kung University



- ▶ The latest creation from Aldebaran, France
- ▶ **Pepper is the first humanoid robot designed to live with humans.**
- ▶ Pepper is a social robot able to converse with you, recognize and react to your emotions, move and live autonomously



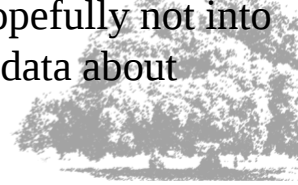
Home Robot : JIBO (3/3)



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- ▶ Jibo is a recently announced, crowd-fundable, simply adorable "social" [Internet of Things](#) robot whose fortes are emotional communication with you and your loved ones, and massive data collection.
- ▶ He's poised to smile, dance, and giggle his way into our hearts, our homes, and hopefully not into the lucrative position of pawing data about where we like to shop.



智能家庭機器人應具備特點



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1. 具自然語言對話系統
2. 可遠距對話 2-3 公尺
3. 對答速度及流利性均佳
4. 具情感對話能力
5. 具IOT 處理能力 可遙控家電產品等
6. 具大數據儲藏及分析處理能力
7. 具快速影像處理能力



Proposed Schematic Smart Home Robot

1. 可分離式家庭機器人
2. 頭部可分離, 可飛, 增加機動性
3. 底部可分離, 作為清掃型機器人



Composition of Proposed Smart Home Robot



1. Smart mobile and flying robotic head



Lower security



Higher security

2. Smart Audio-Visual Interactive main-body



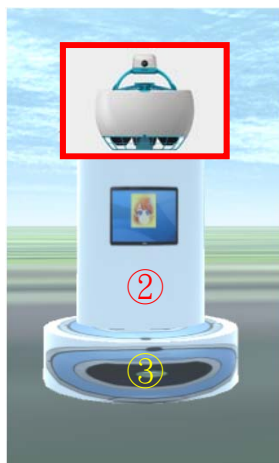
3. Smart Robotic cleaner as feet



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Features of Smart Mobile Robotic Head



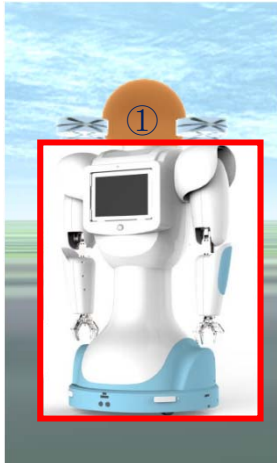
Features:

1. Adaptive to multiple-floors or wider-space with rooms house surrounding settled obstacles.
2. Active-smart flying around multiple floors or rooms.
3. Floors or rooms security monitor.
4. Emergence call for help.
5. Floors or rooms communication b/w user and robot by smart device App etc.
6. Connection b/w main body and mobile flying Robot head .
7. Near-field interaction and controlled by human audio-visual speech, gesture, posture etc. signals.
8. Far-field controlled by App or controller through wireless or 3G/4GLTE communications.

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Features of Smart Robotic Main Body



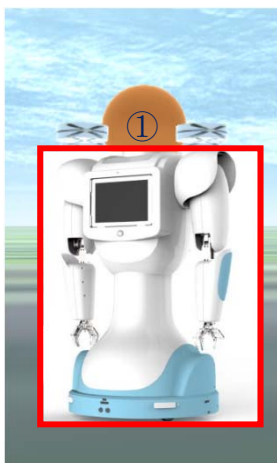
Features:

1. An emotional Companion by dialogue system and audio-visual speech and expression detection.
2. An interactive and evolutionary Companion.
3. Improve your well-being an happiness by Happiness and Suffering scenario images understanding.
4. Home security by Audio-Visual events detection.
5. Edutainment.
6. Elderly Care and Companion.
7. Manage your life, coordinate with your family, and capture special moments.
8. Connect with your friends.

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Specification of Smart Robotic Main Body



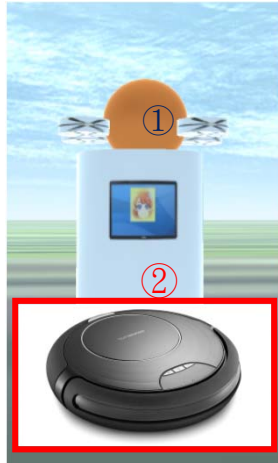
Specification :

1. Kinect *1 ;
2. Sensor:
 - 1). 3D sensor * 1;
 - 2). Speaker * 2 ;
 - 3). Touch Sensor * ;
 - 4). Touch sensor * 4 ;
2. Display : 10 inch touch display
3. Platform: Linux or Windows OS embedded
4. Networking:
 - 1). Wi-Fi: IEEE 802.11 a/b/g/n (2.4GHz, 5GHz)
5. Charging Time: about 120minutes.
6. Dimensions : TBC
7. Weight: TBC
8. Battery: TBC

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Features of Smart Robotic Feet



Features:

1. Carry entire robot for mobility.
2. Separability from robotic main body for clean your entire house at once.
3. To tap a button the robot and it will start working until the floors are clean.
4. Activate the robot as soon as you are done cleaning everything else in the room. This lets you move on while the robot takes care of the floor in the previous room.
5. Mobile the entire robot moving around the house for family interaction and happiness improvement.

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Comparison

	The proposed Robot	Pepper Robot	Buddy Robot	JiBo Robot
Mobile and Separable Head	V	N/A	N/A	N/A
Clean House Functionality	V	N/A	N/A	N/A
An emotional Companion by dialogue system	V	V	V	N/A
Audio-visual speech and expression detection	V	V	V	V
Happiness and Suffering scenario understanding	V	N/A	N/A	N/A
Elderly Care and Companion	V	V	N/A	N/A
Manage your life, coordinate with your family, and capture special moments.	V	N/A	N/A	V
Connect with your friends	V	N/A	N/A	V

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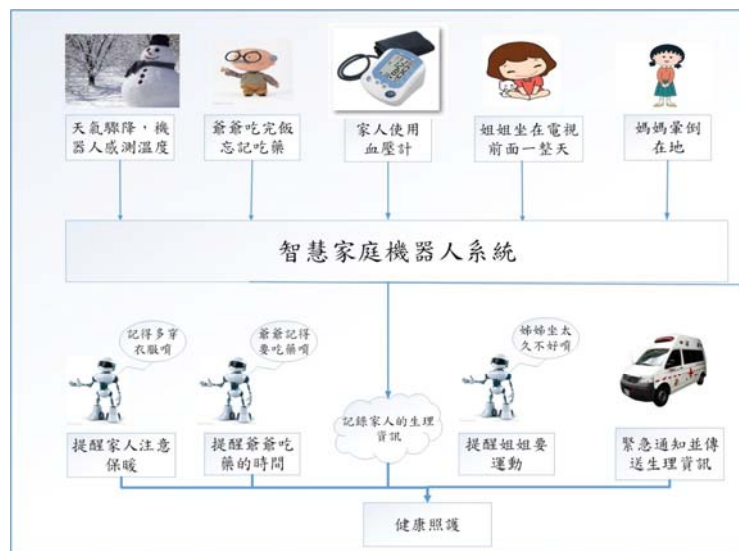
(一)智慧管家



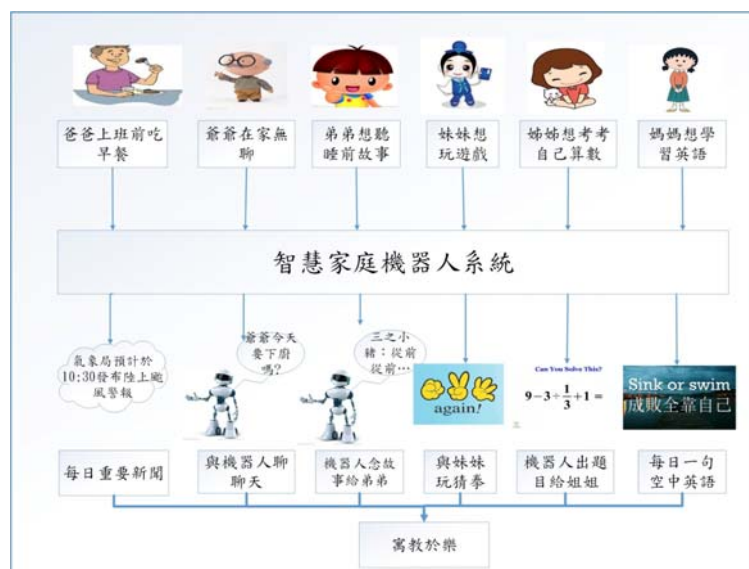
(二)智慧保全



(三) 健康照護



(四) 寓教於樂





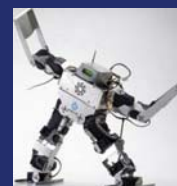
2017 李時珍機器人 可以望聞問切

Cognitive Multimedia IC System Design Lab., National Cheng Kung University



大仁科技大學

智慧機器人
創新應用發展中心



2014/12月19日



2014年12月19日



第十七屆京台科技論壇 (Demo) 京台智能機器人產業發展分論壇

2014年12月19日



2014機器人學習體驗營

2014年06月07日、08日



對象：
國中二年級學生
屏東高中二年級學生
大仁資樂系學生



2016全國羅創客機器人競賽



4. 結論及未來發展



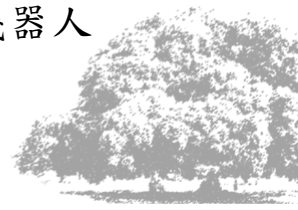
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1. IP的省思:

確保研究成果必須注意專利申請的步驟與效益
及相關法令規定

2. 創意來自跨領域及人文關懷

3. 希望大家一起來推動橘色科技及 AI智能家庭機器人 & 服務型機器人





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第四顆蘋果的故事

► 尋找第四顆蘋果？
或第一顆橘子？

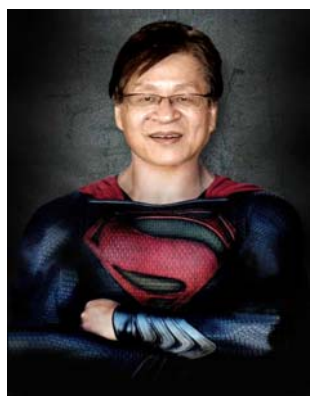


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