



Outline

- Ancient to Modern
 - Year of Wearable Technology
- From Mobile Web to Wearable Web
 - Infrastructure : Push Proxy Gateway
 - Development : RESTful API
 - Latest : Google Physical Web, W3C WoT
- Wearable Designer/Developers (Current Status)
 - UI/UX
 - HTML5/JavaScript

https://www.youtube.com/watch?v=mXf--9njuIM

Ancient Web





Get Local O prodigy

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- · Arts and Humanities Architecture. Photography. Literature ...
- · Business and Economy [Xtra]] Companies. Investments. Classifieds-
- · Computers and Internet [Xtra!] Internet, WWW, Software, Multimedia...
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Yellow Pages - People Search - Mage - Classifieds - Personals - Chat - Email Shopping - My Yahool - News - Sports - Weather - Stock Ouotes - more...

- <u>Arts and Humanities</u> Architecture, Photography, Literature...
- News and Media [Xnat] Current Events, Magazines, TV, Newspapers
- Business and Economy [Xtraf] Comparise, Finance, Employment.
- <u>Computers and Internet [Xma!]</u> Internet, WWW, Software, Multimedia
- <u>Education</u> Universities, K-12, College Entrance...
- Entertainment [Xiral] Cool Links, Movies, Music, Humor
- Government Military, Politics [Xtraf] Law, Taxes...
- Health [Xtral] Medicine, Drags, Diseases, Fitness ...

- Recreation and Sports [Xmat] Sports, Games, Travel, Auton, Outdoors ...
- <u>Reference</u> Libraries, Dictionaries, Phone Numbers
- <u>Regional</u> Countries, Regions, U.S. States.
- <u>Science</u> CS, Biology, Astronomy, Engineering
- <u>Social Science</u> Anthropology, Sociology, Economics.
- Society and Culture People, Environment, Religion.

What's New - Weeldy Picks - Today's Web Events - Yahoo! Internet Life Yahooligans! for Kids -Visa Shopping Guide - Yahoo! Style - 3D Stock Viewer

World Yahoes Australia & NZ - Canada - Denmath - France - Germany - Lapan - Korea Norwy - SE Aria - Sweden - UK & Ireland Yahoe! Metres Allanta - Austin - Booton - Chicago - Dallas / Font Worth - Los Angeles Get Local Minus - Minnengola / St. Paul - New York - SE, Bug - Seattle - Wash D.C. Smart Shopping with Wisa

How to Suggest a Site - Company Info - Openings at Vahoel - Contributors - Vahool How-To



The Web is Dead. Long Live the Internet Chris Anderson and Michael Wolff Aug 17 2010



http://www.wired.com/2010/08/ff_webrip/



Google Trend 2010-2015





Google Trend 2010-2015





Ancient Wearable Devices

- A brief history of wearable computing (MIT Wearable Computer Project)
 - <u>https://www.media.mit.edu/wearables/lizzy/timeline.html</u>
- 戒指算盤
 - 17世紀的清朝年間(1644-1911)
 - 1.2公分長, 0.7公分寬
 - 明代後期開始出現的算盤款式
 - 必須配合粗釘或髮簪等小工具操作 http://www.chinaculture.org/classics/2010-04/20/content_383263_4.htm
- Steve Mann
 - The world's First Cyborg (以無機物所構成的機器,作為有機體(包括 人與其它動物在內身體的一部份)
 - Father of Wearable Computing



Ancient Wearable Devices







Year of Wearable Technology - 2014/5 穿戴式元年 - 2014

Facts:

- 2014 : 30 New Wearable Devices in Market / Season
- <u>https://www.kickstarter.com/discover/advanced?term=wearable</u> 380 Project as 2015/5
- More on other crowdfunding services: Indiegogo, 點名時間, ...
- 天上一日、人間一年 => 人間一月、Web一年 => Web一月、Wearable一年
- Conferences
 - Consumer Electronics Show (CES)
 - <u>http://www.theverge.com/2014/1/7/5284144/the-best-wearables-of-ces-2014-stream</u>
 - http://www.mirror.co.uk/news/technology-science/technology/ces-2015-top-10-wearable-4949652
 - 2015 Mobile World Congress (MWC)
 - http://www.pocket-lint.com/news/133016-best-smartwatches-and-wearables-of-mwc-2015-pebble-lg-huawei-and-more
 - <u>http://www.wearable-technologies.com/upcoming-conferences/</u>
 - <u>http://www.wareable.com/wearable-watchlist/50-best-wearable-tech</u>
 - Types
 - by Capabilities. by Body parts, by Applications, ...
 - 新領域:性生活紀錄與建議,… 😊



Why Wearable Now?

- User point of view
 - Free two hands : new user experience
 - More useful personal connected information
 - Price getting reasonable (cost-effective)
- Developer point view
 - Wide availability and low cost of sensors and hardware components
 - Established APP platform/ecosystem (from mobile phone)
 - Improved Energy efficient technologies (e.g. Bluetooth LE, 6LoWPAN)
- Rapid Changed Environment
 - Web2.0 (Crowdfunding, Social participation)
 - Open (Software, API. Hardware)
 - Culture of Maker and Technopreneur
- Wearable Devices is human-based Internet of Things (IoT)
 - Contacts with human body
 - User Interface (UI) and User Experience (UX)
 - Role of Mobile Phone / APP
 - (Much more than the devices or thing)



穿戴式運算-相關背景與研發主題

- 1. 穿戴式運算簡介與應用 歷史/分類/應用/未來發展趨勢及挑戰
- 2. 穿戴式環境:從物聯網到萬物聯網 -環境/IoT/Cisco IoE/W3C WoT
- 3. 穿戴式平台系統架構 硬體平台/系統架構/關鍵元件(電池/感應器)
- 4. 穿戴式運算之網路技術 身體區域網路BLE/近端網路/網際網路Web/CoAP
- 5. 穿戴式裝置之人機互動 使用者介面設計/使用者經驗/(眼鏡/手表/手環等之軟硬介面設計)/案例
- 手機APP與穿戴式裝置應用開發 RESTful//跨平台HTML5技術/手機APP開發 Native+Hybrid/案例: Google Glass GDK and Mirror API/Android Ware/Apple WatchKit
- 7. 雲端大數據與穿戴式運算
- 8. 擴增實境與穿戴式運算 擴增實境技術/案例
- 9. 睡眠管理與穿戴式運算

附錄:創新案例 - http://sls.weco.net/CollectiveNote20/WearableCases

臉書粉絲頁: <u>https://www.facebook.com/WearableTrend</u>



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Mobile Web Limitations

- HTTP Nature
 - Pull based for desktop computer
 - Client can only request, server can only response
- Device Nature
 - Limited size (I/O)
 - Limited battery (Recharging)
- Wireless Nature
 - High error rate, unstable, lower reliability
 - TCP congestion control Problem
- New Protocols and Gateway are required
 - Mobile Phone is the Gateway for Most Wearable Devices (e.g. Apple Watch, Android Wear)
 - Gateway related issues
 - APP design
 - Device hardware/software interface
 - Device-Phone communication : e.g. Bluetooth LE
 - Web-Device communication : e.g. REST, CoAP

WAP Reference (Proxy Gateway + Server Push)



Wireless Profiled HTTP (WP-HTTP) : supports message body compression of responses Wireless Profiled TCP (WP-TCP) : optimized for wireless environments

Today, Intelligent Mobile Phone OS adopts full HTTP stack, WAP (Wireless Application Protocol) is only for reference.

Mobile Phone is Gateway of Most Wearable Devices

Mobile/IoT/Wearable Protocol Stacks

	Current Web	Future Web	loT Devices	Wearable Devices
Application Layer	HTTP REST	HTTP/2 REST	CoAP REST	CoAP/HTTP REST
Transport	TLS/SSL	Quic		
Layer	ТСР	DTLS	DTLS	DTLS/SSL
		UDP	UDP	UDP/TCP
Network Layer	IP	IP	6LoWPAN	IP
Wireless Bearer	WiFi 3/4G	WiFi 5G	ZigBee 802.15.4	Bluetooth LE

REST (Representational State Transfer) net

- REST (Representational State Transfer) was coined by <u>Roy Fielding</u> to describe a design pattern (software architecture style) consisting of guidelines for creating scalable web services.
- Web service APIs that adhere to the REST constraints are called **RESTful APIs**.
 - Hypertext links to reference related resources, the base URI e.g. http://weco.net/resources/
 - an Internet media type for the data. This maybe JSON or any other valid Internet media type (e.g. XML, Atom, images, etc.)
 - Web CRUD via HTTP
 - GET: to retrieve a resource on the server
 - POST: to create a resource
 - PUT: to change the state of a resource or to update it
 - DELETE: to remove a resource
- Was : for hug dynamic web resources (e.g. Amazon resources)
- Now : for hug number of devices on Internet
 - Imply : An simplified web server on each device
 - CoAP, Google Physical Web, WoT

CoAP(Constrained Application Protocol)

- Overview
 - Very small footprint, RAM, ROM
 - URI (Uniform Resource Identifier)
 - RESTful client-server
 - Resource Discovery
 - Reliable unicast, and Best effort multicast
 - Proxy and Caching is possible
- Transport
 - UDP, and DTLS (Datagram TLS)
 - UDP Port 5683 (mandatory)
 - UDP Ports 61616-61631 compressed 6lowPAN
- CoAP Request/Response semantics
 - GET, POST, PUT, DELETE (Easy to map to HTTP)
 - coap URI: coap://wecolab:5683/~doorcamera/yesterday.xml
- Message size : Must fit in a single IP datagram
 - Default MTU 1280 bytes
 - 6LOWPAN 127 bytes
 - WSN based on IEEE 802.15.4 127 bytes



Google Physical Web

- An early-stage experimental project <u>https://google.github.io/physical-web/</u>
- People should be able to walk up to any smart device a vending machine, a poster, a toy, a bus stop, a rental car - and not have to download an app first.
- Any nearby display such as a phone or tablet can then see these URLs and offer them up to the user. It mirrors the basic behavior we have today with a search engine:
 - The user requests a list of what's nearby.
 - A ranked list of URLs is shown.
 - The user picks one.
 - The URL is opened in browser
- Technical Core
 - Bluetooth LE (BLE)
 - Beacon Payload => URI (i.e. REST enabled) (vs. iBeacon payload => ProximityUUID)





WoT (Web of Things)

- W3C Web of Things
 - http://blog.csdn.net/wallance82/article/details/43971831
- "Things" in the Web of Things are not limited to connected devices, but can also include things like people and places, and abstract ideas, such as events, organizations, and time periods.
- All things should be exposing their services through a RESTful API (either directly or through gateway).
- The request-response nature of HTTP (Pull-based model) is limited for IoT as it does not match the event-driven nature. Then, a publish subscribe mechanism is required.
 - HTML5 WebSocket
 - Translate from CoAP to Websockets
- Open standards for IoT
- Internet of Everything (IoE)





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Open Wearable Technology

- Open Source Software
- Open API/SDK
 - e.g. Google Glass Mirror API, and GDK SDK, ...
- Open Hardware Platforms
 - e.g. Arduino, mbed, ...
- Open Hardware Interface
 - Apple Watch 6 pin Diagnosis Port
 - Pebble Smart straps













User Interaction Design

- Don't care for some IoT services, but critical for wearable
- User Centered Design
 - UI/UX (User Interface / User Experience)
 - Service Design : Empathy Map, Workflow
 - Design Phases : Discovery, Interpretation, Ideation, Experimentation, Evaluation
- User Interface of Wearable Devices
 - Both Software UI/UX and Hardware UI/UX
 - Input : Do-nothing (e.g. BCI), Touch/Push, Voice, Gesture
 - Output : HMD, HUD, Voice/Sound, Tactile Engine
 - <u>Design Guidelines for each device</u>: e.g. Google Glass, Android Wear, Apple Watch (with digital crown, taptic engine)
- APP Design
 - General Design Guidelines e.g. Google Material Design
 - Native Development
 - Hybrid APP Development

JavaScript beyond Web

- <u>http://www.sitepoint.com/javascript-beyond-web-2014/</u>
- Ninja Sphere (Smart Home Controller)
 - https://ninjablocks.com/
 - Ninja Sphere Node.js library
 - Drivers and device definitions for the Sphere are in JavaScript.
- Leap Motion (Gesture Control)
 - https://www.leapmotion.com/
 - Leap Motion JavaScript framework brings all of the capabilities to web applications and Node.
 - v2 (+ Oculus mount) <u>https://www.leapmotion.com/product/vr</u>
- Oculus Rift
 - No official JavaScript API yet
 - JavaScript libraries and plugins for Rift experience
 Desktop/Web/APP











JavaScript beyond Web

- Pebble Time (with Smartstraps)
 - <u>http://en.wikipedia.org/wiki/Pebble_%28watch%29</u>
 - PebbleKit JavaScript framework JavaScript on the phone to pull in data from the web
 - Pebble.js an official framework for building Pebble applications completely in JavaScript
- Development Platforms
 - Framework : Processing.js, Cylon.js (Robotics / IoT), heimcontrol.js (Home)
 - Webduino, Arduino YUN, WeIO, Spark OS, Tessel, Espruino, Intel Galileo/Edison
 - http://webduino.io/
- Google Cardboard
- Myo Armband
- Nest







Conclusion

- Old soldiers never die; They only fade away. Douglas MacArthur
- Web never die. It hacking into our life deeper and deeper. Now, the wearables. - Hsing Mei
- 60分鐘錄影
 <u>https://www.youtube.com/watch?v=mXf--9njuIM</u>
- 創新案例 <u>http://sls.weco.net/CollectiveNote20/WearableCases</u>
- 臉書粉絲頁
 <u>https://www.facebook.com/WearableTrend</u>
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