



作品名稱
即時性之無線音效與
人性化介面娛樂系統
**Real Time Wireless Audio with HID
Entertainment System**

隊伍名稱
幻想緣地 **Fantasizes the Reason Place**

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作品摘要

本作品所實現2.4GHz為基礎之無線錄、放音與人性化介面控制平台，主要的創作特點在於使用者，可透過無線的方式來對遠端的電腦進行錄音、放音、鍵盤、滑鼠與娛樂鍵的5合一控制，且使用者與電腦間的無線傳輸距離，可長達30M以上，達到操作電腦不受連接線束縛的優勢。在實際操作本作品的過程中，不但可達到即時性反應的效果，亦即在進行錄音與放音時，皆不發生有延遲與失真之現象，且鍵盤與滑鼠的動作，亦皆能達到即時反應的動作。本作品開發具有5項電腦週邊功能的無線傳輸平台，而這5項電腦週邊功能分別如下：

- (1) 無線音樂播放(Audio Out)。
- (2) 無線錄音(REC In)。
- (3) 無線電腦鍵盤操控(Keyboard)。
- (4) 無線電腦滑鼠操控(Mouse)。
- (5) 無線娛樂鍵操控(Entertainment)。

本作品主要研發與設計以數位家庭娛樂為基礎之PC Wireless USB Audio/HID原型平台，此原型平台與電腦間，僅使用單

一個USB Dongle，即可實現傳輸5大資料之功能，並自行研發USB Dongle，具備2.4GHz的資料傳輸能力。由於平台使用低成本的2.4G無線傳輸IC (nRF24I01+為美金2元以下/單顆)，作為傳輸之無線USB Audio/HID解決方案，具低成本與低功率消耗之優勢，因此相當適合朝向商品化發展。本作品能夠將人機介面操作請求資料、放音請求資料與錄音請求資料，全部合併成單一無線封包，以傳送具無線等時傳輸功能之裝置。在作品設計方面，可分成USB Dongle端與無線音樂鍵盤端等兩個部分，且這兩部分彼此間透過無線2.4GHz傳輸，以進行溝通USB HID/Audio命令與資料。

本作品所發展無線音樂鍵盤的傳輸技術之情境，如圖所示，係結合Wireless USB Dongle連接在家中客廳的電腦之USB接頭，實現使用者坐在客廳的沙發上透過無線音樂鍵盤的操控，即可操控遠端PC，以傳送HID的動作給電腦與接收來自遠端PC的音樂，且可錄音回遠端PC之情境應用的數位家庭娛樂實施範例，以實現遠端無線控制PC與錄放音不受線的束縛之優點。

指導教授

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- 目前擔任崑山科技大學電機工程學系副教授，先前曾陸續擔任崑山科技大學電機工程學系講師、電信研究所基礎應用研究室助理研究員、臺灣美國無線電公司(RCA)應用電子廠工程師。
- 研究領域：數位積體電路設計與應用、FPGA/CPLD設計與應用、嵌入式系統設計與應用。



ABSTRACT

This device realizes 2.4GHz-based wireless sound recording, music playing, and humanization interface control platform. Main creative features including users can carry out sound recording, music playing, keyboard, mouse, and entertainment key five-in-one control on a remote computer through wireless transmission, and the wireless transmission distance between a user and a computer can be longer than 30M. The advantage is that the computer is not limited by connecting line. In actual operation, the device not only demonstrate instant response, but also has no delay or distortion phenomenon at the time of sound recording and music playing, in addition, the actions of keyboard and mouse can also demonstrate instant response. The device develops a wireless transmission platform possessing five functions of computer peripheral functions, which are:

- (1) Wireless music playing (Audio Out).
- (2) Wireless sound recording (REC In).
- (3) Wireless computer keyboard control (Keyboard).
- (4) Wireless computer mouse control (Mouse).
- (5) Wireless entertainment key control (Entertainment).

The main research & development and design of device are digital-family-entertainment-based PC Wireless USB Audio/HID prototype platform. Only one USB Dongle is used between the prototype platform and a computer to realize the function of transmitting five kinds of data; the self-developed USB Dongle has 2.4GHz data transmission capacity. The platform uses low cost 2.4G wireless transmission IC (nRF24I01+ below USD \$ 2 / one) as a transmission solution of wireless Audio/HID. It has the advantages of low cost and low power consumption. Therefore, it is suitable for developing toward commercialization. The device can combine the request data of human-computer interface operation, the request data of sound playing, and request data



Fig.1 Remote wireless control of PC and music playing, sound recording

of sound recording into a single wireless package to be used as a device with wireless isochronous transmission function. In the respect of device design, it can be divided into two parts of USB Dongle end and wireless music keyboard end. The wireless 2.4GHz transmission is realized between the two parts to communicate USB HID/Audio orders and data.

The scenario of wireless music keyboard transmission technology developed by this device, as shown in the picture, is a scenario application implementation example of digital family entertainment, in which wireless USB Dongle connects to the USB interface of a living room computer so that a user who sits sofa in living room can remote-control the PC through wireless music keyboard operation, transmitting HID actions to the computer, receiving music from remote PC, and recording sound back to remote PC, so as to realize remote wireless PC control with the advantage that sound recording playing is not limited by line.