

# 「校際傑出學術論文授權暨發表會」

## 論文摘要表

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論文名稱	適用於無線通訊技術之寬頻天線設計與應用
英文論文名稱	Broadband antenna designs and applications for wireless communication technology
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學位類別	博士
校院名稱	南台科技大學
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中文關鍵詞	超寬頻天線、單極天線、帶拒、混合式天線、寬頻槽孔天線、單極槽孔天線、MIMO、隔離度。
外文關鍵詞	Ultra-wideband antenna, monopole antenna, band rejected, hybrid antenna, wideband slot antenna, monopole slot antenna, MIMO, isolation
中文摘要	本論文主要是探討適用於現今無線通訊技術之天線如何設計與應用於常見之無線通訊裝置中。在本論文中，首先提出一個適用於超寬頻通訊技術之橋接點單極天線。利用嵌入槽孔的

方式，使此超寬頻橋接點天線在與無線區域網路通訊技術重疊之 5 GHz 頻段產生一個帶拒特性，以降低不同無線通訊技術之裝置間的訊號干擾，並且詳細探討嵌入槽孔的這種帶拒機制與所產生的帶拒特性之關係。

接著本論文提出一結合寬頻槽孔天線與單極天線、適用於超寬頻通訊技術之混合式天線。其中，寬頻槽孔天線提供超寬頻之低頻頻段，單極天線則負責超寬頻之高頻頻段。如此可省略大部份超寬頻天線為了改善與無線區域網路重疊之 5 GHz 頻段之訊號干擾問題所需之額外的帶拒機制。並且，此天線採平面印刷天線設計，包含接地面僅有  $34\text{ mm} \times 30\text{ mm}$ ，適用於大多數之無線通訊行動裝置。

最後本論文提出一個適用於無線區域網路之 MIMO 單極槽孔天線。利用兩個長度不一的單極槽孔天線之共振模態，結合成一個符合無線區域網路之操作頻帶。同時，將一個窄槽縫嵌入於 MIMO 天線模組之間，使天線間之隔離度也能擁有兩個共振模態，進而提高在無線區域網路之操作頻帶內的平均隔離度。此天線同樣採用平面印刷天線設計，包含接地面僅有  $50\text{ mm} \times 20\text{ mm}$ ，適用於常見之 USB 裝置或大多數之無線通訊行動裝置。

## 英文摘要

This thesis is studied about the antenna for recent wireless communication technology how to design and apply to the major mobile wireless devices. Firstly, an access point monopole antenna which is suitable for Ultra-wideband (UWB) technology is proposed in this paper. By embedded a slot in the monopole antenna, the band-rejected characteristic has been generated at about 5 GHz, which can avoid interference between UWB system and WLAN system. We also studied the relationship between the slot or slit for the band-rejected mechanism and the generated band-rejected performance.

Next, a hybrid antenna which combines a broad band slot antenna and a monopole and suitable for UWB application is proposed in this paper. The slot antenna can generate lower band of UWB, and the monopole can generate higher band of UWB. The method can omit band-rejected mechanism which used to avoid interference between UWB and WLAN system. Furthermore, the antenna is fabricated on FR4 substrate. The overall size of the proposed antenna is  $34 \times 30\text{ mm}^2$ , which meet the most wireless mobile communication devices.

The last, a monopole slot MIMO antenna for WLAN is proposed in this thesis. The MIMO antenna designs combine two resonant modes with different length monopole slot antenna and satisfy the WLAN requirement. At the same time, by embedded a narrow slit between the MIMO antenna modules, isolation of the proposed antenna can obtain two resonant mode, and isolation on average can be improved at WLAN band. The dimension of the proposed antenna is  $10.5 \times 20\text{ mm}^2$ , which can suitable for the USB dongle or major wireless mobile devices.