



# 數位通訊模擬實習

## NI LabVIEW & USRP

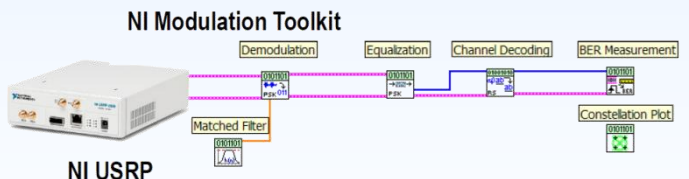
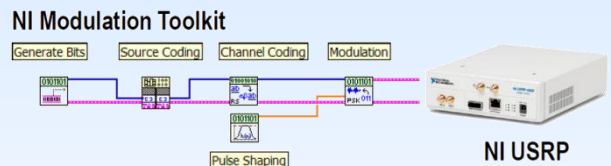
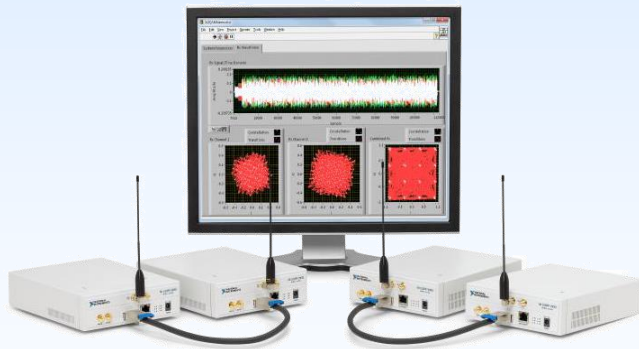
**設備介紹：**軟體無線電(Software-defined radio, SDR)是一種主要由軟體定義作業的通訊裝置，通過軟體編程來實現通訊設備的各種功能，能支援不同標準和技術目標，將SDR運用於資通訊領域的研究與教學是重要的議題；USRP 是由美商國家儀器(National Instruments, NI)生產的 SDR實作平台。

**課程目標：**藉由實驗操作，讓學生實現由理論基礎下設計有線與無線的通訊系統，在理論與實務上不僅能相互獲得印證，更可以補足、了解通訊系統在硬體設備上實作與運作的流程。

**指定教材：**Robert W. Heath Jr, *Digital Wireless Communication: Physical Layer Exploration Lab Using the NI USRP*.

### 實習內容：

- Lab 1: Introductions of NI LabVIEW and USRP
- Lab 2: Modulation and Detection
- Lab 3: Pulse Shaping and Match Filtering
- Lab 4: Synchronization
- Lab 5: Channel Estimation and Equalization
- Lab 6: Frame Detection & Frequency Offset Correction
- Lab 7: OFDM Modulation & Frequency Domain Equalization
- Lab 8: Synchronization in OFDM Systems
- Lab 9: Channel Coding in OFDM Systems
- Lab 10: Final Projects



device name: 192.168.10.5

TX Filter: Root Raised Cos

Alpha: 0.50

Filter Length: 6

Carrier Frequency [Hz] (actual): 915M

Carrier Frequency [Hz] (actual): 915M

Gain [dB] (actual): 0

Gain [dB] (actual): 0

Active Antenna: TX1

Enabled Channel: 0

QAM M-ary: 16

Samples per Symbol: 4

PN Sequence Order: 9

Frame Length [samples]: 2044

Symbol Rate [symbols/sec]: 125k

STOP

device name: 192.168.10.4

filter parameters: TX Filter: Root Raised Cos

Alpha: 0.50

Filter Length: 6

Carrier Frequency [Hz] (actual): 915M

Carrier Frequency [Hz] (actual): 915M

Gain [dB] (actual): 12

Gain [dB] (actual): 12

Active Antenna: RX1

Enabled Channel: 0

Reset Demodulator? True

QAM M-ary: 16

Samples per Symbol: 4

Acq Duration [sec]: 5.00m

Frame Size [samples]: 2500

Symbol Rate [symbols/sec]: 125.00k

Rx Constellation: Constellation Plot

measurements: frequency offset (Hz): -86.37, frequency drift (Hz): -4.31, phase offset: 27.06

STOP