

<b>研究設備</b>	<b>Research Facility &amp; Equipment</b>
<p><b>實體模擬實驗室</b></p> <ul style="list-style-type: none"> <li>• <b>負責人</b></li> <p>傅鶴齡副教授</p> <li>• <b>實驗室地點</b> <p>大義館 703 室</p> <li>• <b>實驗室成員</b></li> <p>吳佳隆、王盈淳、楊皓天、黃正庭(Huynh Thanh Thieh)、梨春科(Le Xuan Khoa)、黃煜展、吳承陽</p> <li>• <b>設備</b></li> <p>機電科學實驗車</p> <p>讓學生透過實體操作, 了解不同 Sensor 如何與 Control Loop 整合, 利用機械、電子、微處理器之結合, 並透過 控制迴路設計之概念完成定義控制體之設計, 以電子原理 與儀器的操作做機電整合之理論基礎, 讓學生經過 實體操作瞭解機電整合 與 感測器之相互關係使學生未來進入業界時, 可與相關業界快速接軌, 並馬上熟悉環境。</p> </li></ul>	<p><b>Real-Time Simulation Lab.</b></p> <ul style="list-style-type: none"> <li>• <b>The Statutory Responsible Person</b></li> <p>Associate Professor Fu Ho-ling</p> <li>• <b>Laboratory</b></li> <p>Room 603, Da Yi Building, Room 603</p> <li>• <b>Laboratory Members</b></li> <p>Wu Chia-lung, Wang Ying-chun, Yang Hao-t'ien, Huynh Thanh Thieh, Le Xuan Khoa, Huang U-chan, Wu Cheng-yang</p> <li>• <b>Facilities &amp; Equipment</b></li> <p><b>Electromechanical Scientific Experiment Vehicle</b></p> <p>Through practical operation, students can understand the integration of different sensors and control loops. Utilizing the integration of mechanical engineering, electronic engineering, and microprocessors, and the concept of control loop design, the design of control volume is completed. Further, with electronic principles and operation of apparatus as the theoretical foundation of electro-mechanical integration, students can learn the correlation between mechatronics and sensors through physical operation. Thus, students can keep up with the steps of relevant</p> </ul>

### 1.8kw 風機發電系統

根據中央氣象局統計數據，台北今年平均溫度上升將近 1.31 ° C，台灣溫室效應已經比其他國家更為嚴重。這些都是地球暖化的影響，並歸因於燃燒化石燃料的結果。據統計，當風力發電機每產生 1 度電，它能夠減少 0.67 公斤的二氧化碳排放量。綠色能源的開發和應用，在現在和不遠的將來一定是主流。我們從 輕型風力發電機 切入再生能源系統的設計，能更容易理解系統的性能與操作，進而提升至系統最佳化。練習此系統之全壽期操作，其經驗可提供業界及家用再生能源及節能系統作參考。

### 倒單擺馬達控制系統

倒單擺在控制領域中，是最為經典的課題之一，配合 MATLAB 的軟體分析，可提升其性能及應用範圍。而 MATLAB 在分析、模擬軟體中，又能結合其他的系統，廣被大家所採用。本實驗室所使用的倒單擺系統，便是結合以上兩者。這系統除了可透過 PC 來對硬體進行控制外，還可以將設計好的控制器載入至工業電腦，進行更接近即時處理(real-time)的操作。希望透過這些設備，讓同學不只是在課堂空學 控制理論，而可以將學習到的知識實際應用、印證，從這最經典的課題 延伸至各更複雜之控制領域 中去設計更複雜的控制器。讓我們在與業界接軌的時候，可以更快上手，更好的結合。

industries and become familiar with the new environment instantly when they join the industrial workforce.

### 1.8 kw Turbine Power Generation System

According to statistics published by the Central Weather Bureau, the average temperature in Taipei has increased by nearly 1.31 degree Celsius (°C) this year, indicating a more severe greenhouse effect in Taiwan than in other countries. Such phenomenon, which is the effect of global warming, can be attributed to burning of fossil fuels. According to statistics, for every 1kWh of electricity generated by a wind turbine, 0.67 kilograms of carbon dioxide emissions can be reduced. Therefore, development and applications of green energy would be the main stream at present and in the near future. Exploring the design of a renewable energy system from a light-weight wind turbine can facilitate the understanding of the system's performance and operation, and further optimize the system. An experience obtained from operating the system for its entire lifespan can be a reference for industrial and home renewable energy and energy-saving systems.

### Inverted Pendulum Motor Control System

An inverted pendulum, which is one of the most classic topics in the field of control technology, can be improved by the MATLAB software analysis software in terms of performance and range of applications. Among all analysis and simulation software, the MATLAB software is widely used by the public due to its compatibility with other systems. The inverted pendulum system used in the lab is a combination of both. In addition to control hardware from a personal computer, the system can also load a designed controller into an industrial computer for

### 嵌入式 機電 實體 模擬平台

為精巧的 模組化 即時控制與擷取平台，除了可提供高效率的 I/O 之外，更可針對 系統時脈 提供絕對彈性之信號特性。用不同的介面卡就可提供相對應的功能。可以做為大型的 嵌入式控制 與擷取應用及類比/數位的資料擷取與控制功能等相關的應用。可為嵌入式量測與控制應用提供最大的彈性發展。

### 奈米級信號量測平台

利用 精密量測 和 奈米級 信號估測及後續處理做基礎研究開發先進之估測技術，應用於醫工及精密量測系統，提升現有設備量測之估算能力並訓練學生參與實作，並申請參與國科會相關研究計畫，同時訓練學生專業能力及申請專利之技巧，使之畢業後能順利進入工業界。目前研究方向為腦波信號之傳達與應用，未來將以醫工作為研究方向。

### 馬達 PID 控制迴路實驗

為一組包含馬達、伺服控制器(含控制器與感測器)、轉接器、馬達控制軸卡之 機電控制實驗。此實驗分為兩種控制模式：步進和伺服模式，藉由控制馬達的轉速與位置，使用不同的參數設定，找到最佳化的控制參數，達到省時省能的目標，並能配合業界，利用伺服模式 學習 PID 控制器之參數設定，求取 最佳系統性能，提供最好的控制模

immediate processing, which bears a resemblance to a real-time operation. It is anticipated that through these devices, students can learn control theories in class, as well as apply and prove the acquired knowledge in real practice, and subsequently come up with the design of a more sophisticated controller by stepping into a more complex level of control technology through this most classic topic, facilitating our perfect integration into the world.

### **Embedded Electromechanical Real Simulation Platform**

The device is a compact and modularized real-time control and acquisition platform. In addition to providing high-performance I/O, its features lies in the capacity of providing absolutely flexible signals to the system clock. Different interface cards also have different corresponding functions.it can be used in applications of large-scale embedded data control and acquisition as well as analogue/digital data acquisition and control. It can maximize the flexible development of embedded measurement and control applications.

### **Nano-scale Signal Measurement Platform**

The platform uses precision measurement and nano-scale signal estimation and subsequent processing as fundamental research to develop advanced estimation techniques. When being applied in the field of medical engineering and precision measurement systems, it can upgrade the measurement and estimation capacities of existing equipment. The platform can also provide students training in actual implementation, applications for participating in research projects of the National Science Council, as well as exercise students' professional abilities and skills to apply for patents, so students can successfully enter the industry after graduation.

式，學習 易測即時之機電系統設計程序。

即時機器視覺系統

即時機器視覺系統其功能:即時性的圖像採集、分析和儲存。實現影像識別、校正、檢測，與光學符號識別 (OCR) 的應用。系統內有作業系統可以 Na 及時處理 不同來源的訊號 做最佳化處理，使整個系統更加穩定與時間延遲降到更低。

- 相關圖片

The direction of research, which centres on the transmission and application of EEG signals at present, is transforming toward medical engineering in the future.

#### **Motor PID Control Loop Experiment**

The electromechanical control experiment consists of motors, servo controllers (including controllers and sensors), adaptors, and motor control cards. This experiment can be divided into two control modes: stepper and servo modes. Through controlling the speed and position of the motors and using different parameter settings, the optimal control parameter can be derived to achieve the goal of time and energy saving and meet industrial needs. Using servo patterns to learn the parameter settings of PID controllers can yield the best system performance, provide the best control mode, and enable students to learn the testable and immediate design process of electromechanical systems.

#### **Real-time Machine Vision System**

A real-time machine vision system has the following functions: real-time image collection, analysis, and storage; fulfilling the applications of image recognition, correction, detection, and optical character recognition (OCR). The operation system can immediately process signals from different sources and optimize the process, which makes the entire system more stable and reduces time lag/time delay.

- **Relevant Photos**

- 負責人

江毅成教授

- 實驗室地點

大義館 801 室

- 實驗室成員

黃家峰、王銘龍、廖博名、王頌博

- 設備

自動插拔力試驗機

本機器適用於 各種連接器之 插入力及拔出力的自動測試，搭配專利設計之自動求心裝置，將可得到完全準確之插拔力試驗。

EMC 量測儀器

量測產品 或是 電子元件中的 電磁相容性(EMC)量測範圍 1GHz/3 GHz。

工作站

利用工作站可以有效率的減少計算時間，也可以進行大量

- **The Statutory Responsible Person**

Professor Chiang I-cheng

- **Laboratory**

Room 801, Da Yi Building

- **Laboratory Members**

Huang Chia-feng, Wang Ming-lung, Liao Po-ming, Wang Sung-po

- **Facilities & Equipment**

**Automatic Insertion & Withdrawal Force Testing Machine**

This machine, which is suitable for automatic tests of insertion and withdrawal force of a variety of electrical connectors, can get a completely accurate insertion and withdrawal force test when paired with a patent design automatic alignment device.

**Electromagnetic Compatibility Measuring Instrument**

The device is to test the electromagnetic compatibility (EMC) of products or electronic components. The measurement range is 1GHz/3 GHz.

**Workstation**

Efficient use of workstations can reduce the computation time and perform a large number of operations.

<p>運算。</p> <p><b>CST</b></p> <p>CST 提供了一個廣泛的仿真軟件，以解決關鍵領域如 EDA、電子、EMC / EMI、微波和帶電粒子動力學，靜力學和低頻之設計挑戰。</p> <p><b>Moldflow</b></p> <p>AutodeskR 的 Moldflow 塑料 射出成型 模擬軟件提供的工具，幫助製造商準確預測 塑料射出 成型過程中驗證和優化塑料零件和 注塑模具的設計。</p> <p><b>Abaqus</b></p> <p>Abaqus 有限元分析產品套件提供了 工業應用領域 一般和複雜工程問題之強大和完整的解決方案。</p> <ul style="list-style-type: none"> <li>• 相關圖片</li> </ul>	<p><b>CST</b></p> <p>CST offers a wide range of simulation software to address critical fields such as EDA, electronics, EMC/EMI, microwave, charged particle dynamics, statics, and challenges to the design of low frequency.</p> <p><b>Moldflow</b></p> <p>Autodesk Simulation Moldflow plastic injection molding design software helps manufacturers verify and optimize the design of plastic parts and injection molds through accurate prediction of the process of plastic injection molding.</p> <p><b>Abaqus</b></p> <p>The Abaqus FEA, which is a software suite for finite element analysis, provides powerful and comprehensive solutions to general and complex engineering problems in industrial applications.</p> <ul style="list-style-type: none"> <li>• <b>Relevant Photos</b></li> </ul>
<p><b>智慧系統實驗室</b></p> <ul style="list-style-type: none"> <li>• 負責人</li> </ul> <p>蘇國和副教授</p> <ul style="list-style-type: none"> <li>• 實驗室地點</li> </ul>	<p><b>Intelligent System Laboratory</b></p> <ul style="list-style-type: none"> <li>• <b>The Statutory Responsible Person</b></li> </ul> <p>Associate Professor Su Kuo-ho</p> <ul style="list-style-type: none"> <li>• <b>Laboratory</b></li> </ul>

大義館 803 室

- **實驗室成員**

呂宗憲、張博瑞、蘇明煌(To Minh Hoang)、林謙、許睿尹、  
潘晉發(Phan Tan Phat)、陳冠良、廖浩宇、王柏棋

- **設備**

數位式示波器 (DL1640)

量測 與 儲存 伺服驅動系統 或其他嵌入式智慧型系統  
的信號,此示波器具有下列功能:

- 1.輸入頻道數: 4ch
- 2.輸入藕合: 1M±1.0%, 28PF at 1MHz
- 3.最大輸入電壓:300V DC or 300Vrms CATI, 424V peak.
- 4.電壓解析: 1mV ~ 10V
- 5.頻寬: 200MHz
- 6.取樣率: Real Time Sampling Mode: 200M S/S, Equivalent  
Time Sampling Mode: 50GS/S
- 7.記憶深度: 8MW/ CH
- 8.觸發模式: Auto, Auto-Level, Normal, Single, Single (N)
- 9.觸發型式: Edge, A→B(N), A Delay B, OR, Pattern, Pulse  
Width, TV
- 10.顯示換頁率: 60 Screen/s for 100KW Memory Length, 30  
Screen/s for 1MW Memory Length

Room 803, Da Yi Building

- **Laboratory Members**

Lu Tsung-hsien, Chang Po-jui, To Minh-hoang, lin Chien, Hsu Jui-yin,  
Phan Tan-phan, Chen Kuan-liang, Liao Hao-yu, Wang Po-chi

- **Facilities & Equipment**

**Digital Oscilloscope (DL1640)**

The digital oscilloscope, which is used to measure and store signals from servo  
drive systems or other embedded intelligent systems, has the following features:

1. Number of input channels: 4ch
2. Input coupling: 1M±1.0%, 28PF at 1MHz
3. Maximum input voltage: 300V DC or 300Vrms CATI, 424V peak.
4. Voltage Resolution: 1mV ~ 10V
5. Bandwidth: 200MHz
6. Sampling Fraction/Rate: Real Time Sampling Mode: 200M S/S, Equivalent  
Time Sampling Mode: 50GS/S
7. Memory Depth: 8MW/ CH
8. Trigger Mode: Auto, Auto-Level, Normal, Single, Single (N)
9. Trigger Type: Edge, A→B(N), A Delay B, OR, Pattern, Pulse Width, TV
10. Screen-Changing Rate: 60 Screen/s for 100KW Memory Length, 30  
Screen/s for 1MW Memory Length

11.顯示器: 6.4-in, TFT Color LCD

12.垂直解析: 8bits

13.高垂直解析: 13 bits

14..放大功能: 具有同時放大兩指定區域波形功能, 最多 8 個放大波形同時顯示

全向輪 機器人

1. 用於搭載 PC 或 FPGA 控制系統於此移動式平台上, 雙眼平行視覺/手眼協調裝置實驗, 服務型機器人基礎平台, 偵查或保全機器人, 其他 Indoor 實驗平台。
2. 可用來驗證智慧型法則。三輪全向輪(3 輪驅動)
3. 驅動輪採 DC 馬達(附 encoder), torque 8.9Kg-cm, 轉速 100rpm, 41 瓦
4. 加裝 Tiny OS 的 WSN( wireless sensor network)進行無線資料收集。

兩輪 機器人 自走車

用來驗證智慧型演算法則, 驗證兩輪平衡功能。同時用於學習 BASIC 的語法與邏輯觀念, 開放性設計, 可與各式電子零件相結合, 充分發揮機電整合的創意。具備 MSRS 微軟平台, 可整合各類機器人運動與感測行為。

交流伺服數位即時控制系統

11. Display: 6.4-in, TFT Color LCD

12. Vertical Resolution: 8bits

13. High Vertical Resolution: 13 bits

14. Amplifying Function: having the function of amplifying waveforms in two designated areas simultaneously, and is able to displaying up to eight amplified waveforms all together.

### **Omni-Wheels Robot**

1. The mobile platform can be paired with a PC or an EPGA-based control system, parallel binocular vision / eye-hand coordination experiments, basic platforms of service robots; investigation or security robots, and other indoor experiment platforms.
2. It can be used to verify the law of intelligence. Three omni-directional wheels (driven by three wheels).
3. A DC motor (with an encoder attached) is used on the robot's driving wheels; the torque is 8.9 Kg-cm; the speed of moving is 100rpm, 41 watts
4. It is installed with Tiny OS, an operating system design for wireless sensor networks, to conduct wireless data collection.

### **Two-Wheeled Robotic Self-Propelled Vehicle**

The two-wheeled robotic self-propelled vehicle, which can be used to verify intelligent algorithms and the balance of two wheels, can also be used for learning



交流伺服馬達實驗平台可用來發展智慧型伺服驅動系統

\*交流感應伺服馬達 100W, 額定轉速 3000rpm, 附 Encoder 2000 ppr

\*交流感應 伺服馬達 垂直板

\*馬達負載: 磁粉式剎車 DC24V, 0.47A, 0.88Kg,

1.1~1.8Nm, 1800rpm

\*磁粉式剎車垂直板

\*傳動機構: 時規皮帶輪, 減速比 1: 5, 附圓周角度指示 刻度轉盤

\*馬達平台: 鋁合金

\*對接式連軸器、滾珠軸承×2

電力 電子 及 電機控制模擬系統

- 1.用以 設計 並模擬 電力 電子 和 電動機 實驗。
- 2.可模擬風力、太陽能、燃料電池, 有範例可供參考。
- 3.可與 Ansys 或 Multiphysics、SmartFEM 結合使用。
- 4.可 模擬轉換能源 並完成電力電子及電動機課程等課程 需求。
- 5.具有 C code 產生器,可使用 C-script 語法, 並自行建立使 用者模型。
- 6.可和 Simulink 結合做分析。
- 7.可和機械設計工具軟體結合。
- 8.模擬執行過程中, 即可看到模擬的結果。
- 9.用來發展智慧型伺服驅動系統。

basic programming languages and logic concepts. With an open design, it can be integrated with various types of electronic components to bring electro-mechanical creativity into full play. The Microsoft Robotics Studio (MSRS) can also incorporate various types of robotic motions and sensing behaviors.

### **AC Servo Digital Real-Time Control System**

The AC servo motor experiment platform can be used to develop an intelligent servo drive system. \*AC Induction Servo Motor: 100W, rated speed: 3000rpm, with encoder 2000ppr.

\*AC Induction Servo Motor Vertical Plate:

Motor Load: Magnetic brake: DC24V, 0.47A, 0.88Kg, 1.1~1.8Nm, 1800rpm

\* Magnetic Brake Vertical Plate:

\*Transmission Mechanism: timing pulleys; gear reduction ratio: 1:5; with a dial to show the degrees of the circumferential angle

\*Motor Platform: Aluminum

\*Butt-couplings, ball bearings X2

### **Power Electronics and Electrical Machine Control Simulation System**

1. The system can design and simulate experiments of power electronics and electrical machines.

### Zigbee 嵌入式無線感測監控系統

1. 用來發展 智慧型 WSN, 環境監控, 擬架在輪型機器人上, 進行資料收集。

#### 2. XSBASE270-Module 系統架構

主板規格: CPU: PXA270 520MHZ

記憶體 : SDRAM: 64MB

Flash: NOR Flash 32MB Above

Display: TFT 8" LCD Above

通訊介面 : Serial Port : RS232 Interface x 1, Ethernet :

10/100 Base-T Ethernet x 1

#### 3. TI ZigBee SOC CC2430F128

採用 TI ZigBee SoC CC2430F128 晶片

CC2430 (包含高速 51MCU 和 2420 射頻模組)

採用 SINK 匯聚節點功能, 對鄰近節點採集的資料進行分析  
v 開道板可以作 8 種感測模組的燒錄功能, 含雨滴, 霍爾, 火源, 溫溼度, 光照度, 海拔, 血壓, 流量等 8 種感測模組。

#### 智慧型 無線影像 導航機器人

1. 環境探測機器人使用

2. 具有感測器、機器手臂、影像監控、立體視覺系統、雷射定位導航及戶外定位導航等系統。

3. 針對自動控制、人工智慧、影像處理、機器視覺、無人自走車 AGV、multi-robot 合作運算及機器人足球等領域的驗證平台。

2. The system can simulate wind power, solar power, fuel cells (examples can be provided for reference).
3. The system can be used in pair with Ansys, Multiphysics, or SmartFEM.
4. The system can simulate energy conversion and suit the needs of courses such as power electronics and electrical machines.
5. The system has a C code generator. Users of the system can use C-script programming language and create their own user models.
6. The system can be paired with Simulink for analysis.
7. The system can be paired with mechanical design software.
8. The results of simulation can be observed when the simulation is in progress.
9. The system can be used to develop intelligent servo drive systems.

### Zigbee Wireless Embedded Sensor and Monitoring System

1. The system can be used to develop intelligent wireless sensor networks, environmental monitoring, and can be mounted on wheeled robots for data collection.
2. System Architecture: XSBASE270-Module

Motherboard Specification: CPU: PXA270 520MHZ

Memory: SDRAM: 64MB

Flash: NOR Flash 32MB Above

### Wheel Robot

用來驗證智慧型演算法則，驗證兩輪平衡功能。同時用於學習 C 語法與邏輯觀念，開放性設計，可與各式電子零件相結合，充分發揮機電整合的創意。具備 MSRS 微軟平台，可整合各類機器人運動與感測行為。

### 機器人移動平台 U-Bot

- 1.開發智慧型機器人使用
- 2.兩輪差動控制的移動平台
- 3.直線、旋轉的速度運動控制及定位運動控制功能。內建 16 個超音波測距離感知器及 4 個紅外線測距離感知器

### Festo Robotino

- 1.用於發展輪型環境探測機器人。
2. 可原地 360 度旋轉任一角度，可往任一方向行走，達到全向的控制
3. 透過視覺系統與影像處理的技術，判別物件。
6. 結合顏色判別，自行運走的功能，達到夾取各色物件、置於不同顏色區域
7. IO 擴充功能，可外接輸入裝置：如各式感測器；輸出裝置：如燈泡、蜂鳴器、直流馬達
8. 額外馬達擴充，可外加馬達夾取裝置，夾取各式工件
9. 透過感測器協助，程式的自我判斷，達到避免碰撞的功能。在前進的過程中，能夠閃避眼前的障礙

Display: TFT 8"LCD Above

Communication Interface: Serial Port : RS232 Interface x 1, Ethernet : 10/100 Base-T Ethernet x 1

### 3. TI ZigBee SOC CC2430F128

Adopting TI ZigBee SoC CC2430F128 chip

CC2430 (including high-speed 51MCU and 2420 RF Module)

Data collected from neighboring nodes can be analyzed by utilizing the sink node's function of receiving messages from the other nodes. The v gateway board has the function of a burner for eight sensing modules, which include rain drops, Hall, fire, temperature and humidity, light intensity, altitude, blood pressure, and flow rate.

### Wireless Intelligent Imaging- based Navigation Robot

1. The robot can be used as an environment exploration robot.
2. The robot is installed with sensors, video surveillance, three-dimensional system, laser positioning navigation, and outdoor positioning and navigation system.
3. The robot can act as a verification platform for automatic control, artificial intelligence, image processing, machine vision, unmanned self-propelled vehicle AGV, and multi-robot collaboration in fields such as computing and robot soccer.

10. 控制語言，除了圖形化語言之外，還能支援其他開放性語言，如 C++

#### **Wheeled Robot**

In addition to verifying intelligent algorithms and balance on two wheels, students can also use the robot to learn the C programming language, logic concepts, and open design. In addition, the robot can be integrated with various kinds of electronic components to give full play to creativity in mechatronics. The Microsoft Robotics Studio (MSRS) platform can also integrate various types of robotic motions and sensing behaviors.

#### **Robot Mobile Platform U-Bot**

1. It develops intelligent robots for use.
2. Double-Wheel Differential Control Mobile Platform
3. Linear, rotary speed motion control and position control functions.  
Built-in 16 ultrasonic distance measuring sensors and four infrared distance measuring sensors.

#### **Festo Robotino**

1. It can be used to develop wheeled environment explorer robots.
2. It can be rotated 360 degrees in a fixed place, can be adjusted to any angles, and can walk in either direction to achieve omni-directional control.
3. It can discriminate objects through a visual system and image processing technology.
4. Incorporating the functions of color discrimination and autonomous

	<p>movements, it can grip various colors of objects which are placed in areas of different colors.</p> <ol style="list-style-type: none"> <li>5. I/O Expansion: it can be connected with external input devices such as various sensors, output devices such as light bulbs, buzzers, and DC motors.</li> <li>6. It has extra motor expansion and can be installed with extra motors and gripping devices to grip various work pieces.</li> <li>7. Collision with other objects can be avoided with the assistance of sensors and self-adjustment of programs. It can dodge frontal obstacles in the process of proceeding.</li> <li>8. In addition to graphical languages, control language can also support other open languages such as C++.</li> </ol>
<p><b>機電控制實驗室</b></p> <ul style="list-style-type: none"> <li>• <b>負責人</b> 黃正自教授</li> <li>• <b>實驗室地點</b> 大義館 804 室</li> <li>• <b>設備</b> 數位即時控制系統 使用於 機電控制設計 與 驗證課程 相關之教學及專題</li> </ul>	<p><b>Mechatronic and Control Lab</b></p> <ul style="list-style-type: none"> <li>• <b>The Statutory Responsible Person</b> Professor Huang Zheng-zi</li> <li>• <b>Laboratory</b> Room 804, Da Yi Building</li> <li>• <b>Facilities &amp; Equipment</b> <b>Digital Real-Time Control System</b></li> </ul>

研究，並使學生了解 馬達帶動 之 機電系統 之 智慧型控制設計與驗證所牽涉之相關軟體技術，並豐富論文研究內容及貢獻。

示波器、電源供應器、信號產生器

使學生學習 **intelligent adaptive control** 實踐過程中，訊號之量取與除錯，在學習過程中可讓學生實際操作，並深入了解智慧型控制原理及實務，並可提供研究生論文的實驗資料與數據。

線上 即時 控制器 發展系統

使用於 **intelligent adaptive control** 課程相關之教學及網路監控 相關研究並使學生了解 智慧型控制器和如何快速實現，並熟悉相關軟體技術。

無線遙控之輪型機器人發展平台

使用於 機電控制 設計與驗證 課程相關之教學及網路監控相關研究 並使學生了解機構運動控制及其實現所牽涉之原理與實務，並豐富其論文研究內容及貢獻。

適應性 智慧型 兩軸式 機械手臂 控制發展平台

機械手臂即時控制系統 的教學訓練，使學生了解適應性智慧控制實際運用所牽涉之相關硬體技術。

The digital real-time control system, which is used in courses or seminars in relation to the design and verification of electromechanical control, can enable students to understand the relevant software and hardware technology involved in the design and verification of the intelligent control of motor-driven electromechanical systems, as well as enrich the content and contribution of students' research papers.

### **Oscilloscope, Power Supplier, Signal Generator**

These devices enable to students to learn measuring off and debugging of signals in the course of performing intelligent adaptive control. In the course of learning, students can practically operate these devices and have a deep understanding of theories and practice of intelligent control, and may obtain data and figures for experiments in their graduation thesis.

### **Online Real-Time Controller Development System**

The online real-time controller development system, which is used for teaching intelligent adaptive control-related courses and network monitoring-related research, not only enables students to understand intelligent controllers and a faster way of implementation, but also familiarizes students with relevant software and hardware techniques.

### **Remote-Controlled Wheeled Robots Development Platform**

The remote-controlled wheeled robots development platform, which is used for

teaching electromechanical control design and verification-related courses and network monitoring-related research, not only enables students to understand the motion control mechanism along with theories and practices involved in its implementation, but also enriches the content and contribution of students' research papers.

**Intelligent Adaptive Two-Axis Robotistic Arm Control and Development Platform**

Training involved in teaching robotic arms real-time control systems enables students to understand relevant software and hardware techniques which are involved in the practical applications of intelligent adaptive control.