



Smart Home 智能家居 Teaching Kit 教學套件

- 含豐富的軟硬件資源
Rich in hardware and software resources
- 操用 Scratch + Arduino 實作的方式
With the implementation of Scratch & Arduino
- 深入淺出地學習各項硬件原理和編程技巧的實際應用
Learns the principles of hardware and the practical application of programming skills easily
- 全部教學材料採用開放源碼軟硬件
Teaching materials are developed with open-source hardware and software
- 可配合校本課程修訂教學內容 / STEM 教學活動
The teaching content can be edited to meet any school-based curriculum / STEM learning





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零件 Parts

2 路繼電器模組 /
2-channel relay Module
(or 2-way relay module)



DS1302 時鐘模組 /
DS1302 RTC Module



擴展板 /
Nano Shield



磁簧開關模組 /
Reed Switch Module



Arduino NANO 兼容主板 /
Arduino NANO Compatible Board



1602 液晶顯示模組 /
1602 LCD Module



連接線 / Jumper Wires



HC-SR501 人體感應器模組 /
HC-SR501 PIR Sensor



紅外線傳送器模組 /
IR Transmitter Module



光敏電阻模組 /
LDR Sensor Module



DHT11 溫濕度感應器模組 /
DHT11 Temperature and Humidity Sensor
Module (or DHT11 Sensor Module)

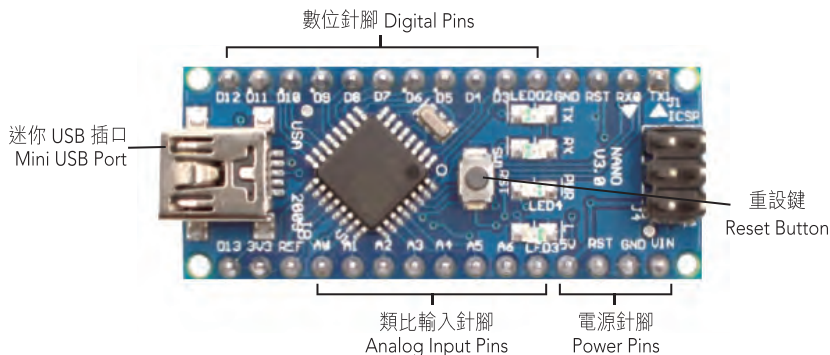


無源蜂鳴器模組 /
Passive Buzzer Module



重要零件介紹 Introduction to Major Parts

Arduino NANO 兼容主板 Arduino NANO Compatible Board



Arduino Nano 是基於 ATmega328 的微處理器，可以直接應用在麵包板上。它具有與 Arduino UNO 相同的功能，但體積更小。它沒有直流電源插孔，並改用了迷你 USB 插頭。

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328. It has the same functionality of the Arduino UNO, but in a much smaller package. It lacks only a DC power jack, and works with a Mini USB cable.

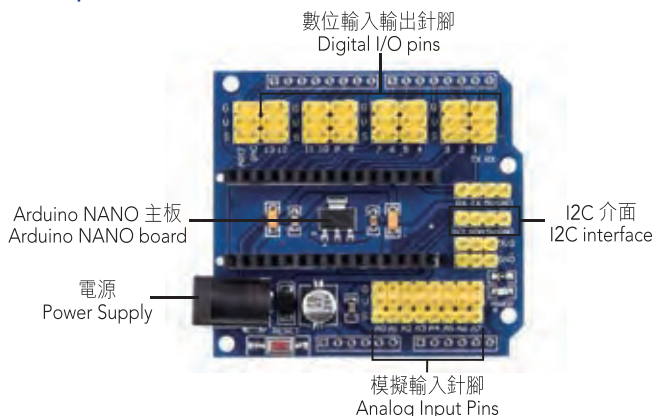
2 路繼電器模組 Two-channel relay module



繼電器是一種用較小的電流去控制較大電流的一種「自動開關」，它可以讓我們控制原本 Arduino 主板控制不了的裝置。2 路繼電器模組是指它可以同時控制兩組電路的開關。

Relays can be used to control high voltage devices which cannot be powered directly from Arduino boards. A two-channel relay module can control two devices at the same time.

Arduino NANO 多用途擴展板 I/O Expansion Shield for Arduino NANO



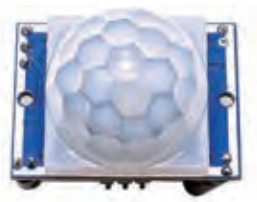
Arduino NANO 多用途擴展板是專為 Arduino NANO 而設，方便連接各類感應器的多用途擴展板。擴展板支援直接使用跳線，而每個輸入輸出針腳都配備了 5V 和 GND，以方便連接感應器模組。擴展板有獨立的 I2C 介面以供 I2C 設備使用。擴展板更有獨立的供電模組，為感應器和摩打提供額外的電源。

The Arduino Nano I/O Expansion Shield acts as an expansion board for the Arduino Nano microcontrollers. The shield supports jumper wires for rapid prototyping and each pinout includes 5V and GND pins for easy connection to sensors. It has an independent I2C interface for connecting I2C devices. It also has independent power supply to provide extra power for servo and other sensors.

HC-SR501 紅外線人體感應器 HC-SR501 Pyro-electric Infrared Detector

紅外線人體感應器主要是利用物體輻射出紅外線，當紅外線照射到材料上而產生電荷的現象。PIR 感應器可以偵測人體進入和離開感應器範圍。

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range.



1602 液晶顯示模組

1602 LCD Module

1602 液晶顯示模組能同時顯示兩行，每行 16 個，總共 32 個字符，其背光通常是黃綠色或者是藍色。



This is a basic 16 character by 2 line dot matrix display, usually comes with black text on green or blue background.

DHT11 溫濕度感應器

DHT11 Temperature and Humidity Sensor

DHT11 溫濕度感應器是一款含有已校準數位輸出的溫度和濕度感應器。

DHT11 digital temperature and humidity sensor is a composite sensor contains a calibrated digital signal output of the temperature and humidity.



紅外線傳送器模組

IR transmitter module

紅外線傳送器模組內建了一顆紅外線 LED。它可以用來發送紅外線訊號以控制不同的家庭電器，例如電視機或者冷氣機。

The Infrared Transmitter Module consists of a 5mm IR LED. It can be used to transmit IR signals to control various home appliances such as TV or air conditioners.



全彩 LED 模組

RGB LED Module

全彩 LED 模組內建了一顆全彩 LED，我們可以通過 3 個針腳來控制紅綠藍三原色的亮度，從而混合出不同的顏色。

The RGB LED module consists of a full color LED. Three different pins are used to control the brightness of red, green and blue to achieve full color mixing effect.



紅外線接收器模組

IR receiver module

紅外線接收器模組可以用來接收紅外線訊號，它可以和紅外線發射器模組一起使用，也可以用它來接收不同紅外線遙控器的訊號。

The IR receiver module consists of an IR receiver and it can receive IR signals. It can be used with the IR transmitter module and it can receive IR signals from various IR remote controllers.

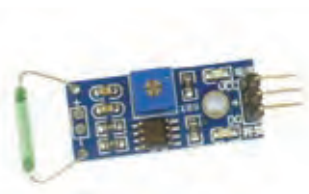


磁簧開關模組

Reed Switch Module

磁簧開關是一種通過施加磁場而操作的電開關。基本結構是將兩片磁簧片密封在玻璃管內，而兩片簧片之間只留極少的空隙。

The reed switch is an electrical switch operated by an applied magnetic field. It consists of a pair of contacts on ferromagnetic metal reeds in a hermetically sealed glass envelope.



DS1302 時鐘 模塊

DS1302 RTC Module or DS1302 real time clock module

DS1302 是一款低功耗的實時時鐘芯片。它可以提供年、月、日、周日、時、分、秒的資訊，並且具有潤年補償等多種功能。

DS1302 is a chip with built-in real-time clock / calendar and a 31-byte static RAM. It provides information about second, minute, hour, day, week, month, and year. DS1302 can automatically adjust the number of days per month and days in leap year.

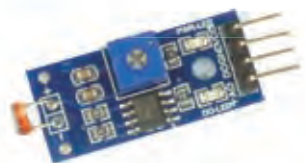


光敏電阻模組

LDR Sensor Module

光敏電阻模組用於檢測光的強度。它同時擁有模擬輸出針腳 (AO) 和數字輸出針腳 (DO)，適合不同的應用。

LDR sensor module is used to detect the intensity of light. It has both analog output pin and digital output pin labelled as AO and DO respectively on the board.



無源蜂鳴器模組

Passive Buzzer Module

蜂鳴器是可以產生聲音的信號裝置，有機械型、機電型及壓電型。我們可以控制無源蜂鳴器的音高，從而用它來播放音樂。

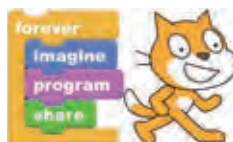
A buzzer is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. You can control the sound frequency of a passive buzzer and play music on them.



程式語言

Programming Language

Scratch 程式語言是由 MIT 開發的教學用程式語言，特別為中小學生而設計。Scratch 使用圖形化的積木編程界面，簡單易用。



參考書目：① PA01 Scratch 初階；② PA02 Scratch 進階

Scratch is a free educational programming language that was developed by MIT. Users program in Scratch by dragging-and-dropping programming blocks onto each other like jigsaw puzzle.



Reference Books: ① PA01 Scratch: Basic Skills ; ② PA02 Scratch: Advance Skills



產品特色

Product Features

1. 詳盡教學課程 Detailed Teaching and Learning Materials

- 資料詳盡，鼓勵有效學習。
Detailed information is provided to facilitate student's learning.
- 涵蓋多個學科的知識和技能，實踐跨學科學習。
Covers knowledge and skills of various subjects, practises interdisciplinary learning.
- 教程支援電腦、平板及智能手機，方便易用。
Tutorial supports different devices including computers, tablets and smart phones.
- 教程另備 WORD 格式，教師可配合校本課程修訂教學內容。
Tutorials are equipped with WORD format. Teachers can adjust the teaching content according to school-based curriculum.

2. Scratch 語言教學 Scratch Programming Language

- 採用流行、簡易並免費的 Scratch 程式語言來進行教學，學與教更簡便。
Scratch, a popular, simple and free programming language is used, which makes learning and teaching easy.
- 特別加入與硬件相關的編程技巧。
Hardware-related programming skills are covered.

3. 開放源碼的軟硬件 Open-source Software & Hardware

- Arduino 和 Scratch 都是開放源碼的，教師可以按校本需要調整內容。
Arduino and Scratch are open-source, teachers can adjust the teaching content according to school needs.



教材和學材

Teaching and Learning Materials

1. 基礎知識 Basic Knowledge

- 附多個基礎知識教程，即使完全不懂 Arduino、Scratch 和電路，也能輕鬆學習。教師可根據學生的水平，靈活調適教程。

Basic knowledge tutorials of Arduino, Scratch and electric circuit are provided for beginners. Teachers can adjust the curriculum according to the needs.

2. 自學教材 Self-Learning Guide

- 每個專案都有詳盡的自學教材，鼓勵自主學習。

Each project contains detailed self-study materials, encourages self-directed learning.

3. 資源檔案及建議答案 Resource Files & Suggested Answers

- 全部作業均配備相關的資源檔案及建議答案。

All assignments are equipped with relevant resource files and suggested answers.

4. DIY 內容 DIY Materials

- 額外為專案提供 AI 格式的設計圖檔，讓學生發揮創意，自行美化作業。

Design files with AI format are provided for the projects, students can beautifying their assignments.

5. 互動光碟及專用網站 Interactive CD-Rom & Companion Website

- 光碟和網站均提供完整的教材和學材，方便備課、教學或自學。

CD Rom and website with full teaching and learning materials are provided.

(網址 Website : <http://www.apricot.com.hk/stemkit/>)



專案一：智能家居（上）

Project I: Smart Home Part I

學習使用智能家居系統裡面常見的感應器和零件，並通過編寫程式去建立智能家居系統的自動化規則。

Learn how to use some common sensors and components of a smart home system, and create automated rules by programming.

專案二：智能家居（下）

Project II: Smart Home Part II

學習如何令智能家居系統控制其他電器，並編寫更複雜的自動化規則。

Learn how to control other home appliances from the smart home system, and write some complicated rules.

專案資源 Project Resources

學習教材

Learning Guide



資源檔案

Resource Files



建議答案

Suggested Answers



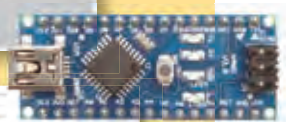
DIY 內容

DIY Materials



產品特色 Product Features

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