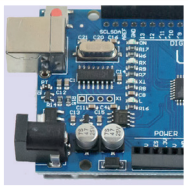
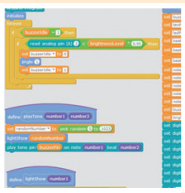
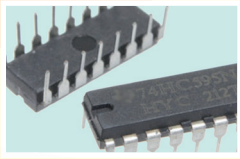
S Science T Technology E Engineering M Maths

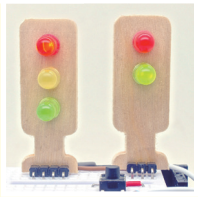
LED 燈教學套件
Lights Teaching Kit

- 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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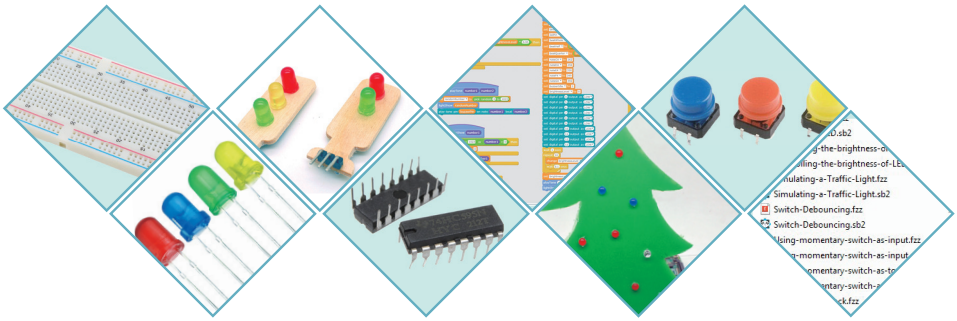
Contents

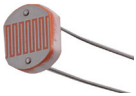


零件 Parts

USB 線 / USB Cable

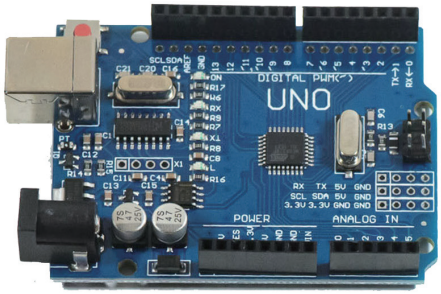
蜂鳴器 / Buzzer

光敏電阻 /
Light Dependent Resistor



輕觸開關 /
Tactile Button

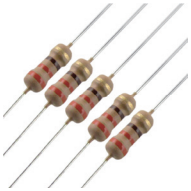
Arduino UNO 兼容主板 /
Arduino UNO Compatible Board



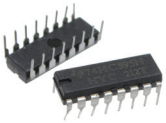
發光二極管 / LED

連接線 / Jumper Wires

電阻 / Resistor

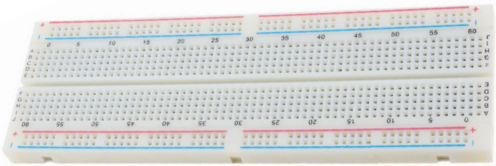


移位暫存器 / Shift Register



實驗平台 / Acrylic Platform

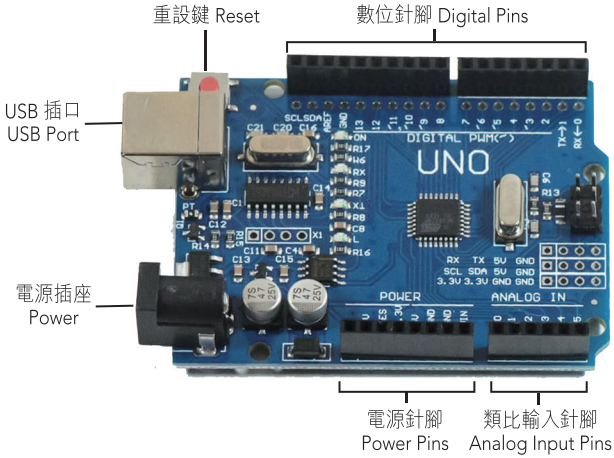
麵包板 / Breadboard



電池盒 / Battery Holder

重要零件介紹 Introduction to Major Parts

Arduino UNO 兼容主板 *
Arduino UNO Compatible Board

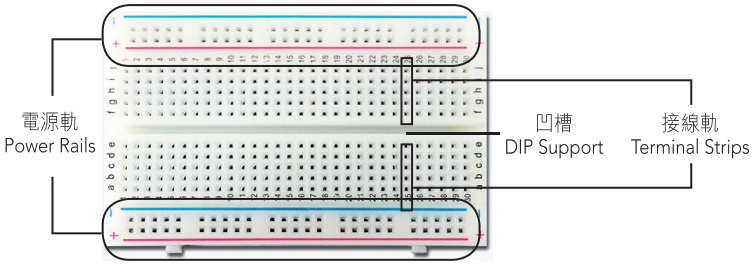


Arduino UNO 兼容主板是使用 ATmega328 晶片的微處理器，其擁有 14 個數碼輸入輸出針腳，和 6 個類比輸入針腳。

Arduino Uno Compatible Board is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins and 6 analog inputs pins.

* Arduino 是一種微控制器，由幾位意大利教授在 2005 年開發。它是開放源碼的，且簡單易用，所以配合不同需求的 Arduino 板型號隨後陸續出現。常見的型號包括 UNO、LEONARDO、DUE 等。本教學套件選用 Arduino UNO 兼容主板。
* Arduino is a microcontroller developed by a few Italian professors in 2005. It is open-source and easy to use, so a variety of board models were designed to satisfy huge demands from customers. Common models include UNO, LEONARDO, DUE and so on. Arduino UNO compatible board is used in this teaching kit.

麪包板
Breadboard

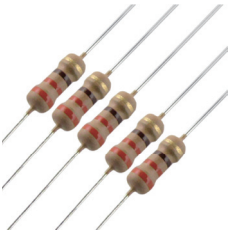


發光二極管
Light-Emitting Dior

發光二極管是會發光的電子零件，它可以將電能轉化為光。發光二極管有點像電燈泡，但其省電和耐用程度，均比傳統電燈泡優勝得多。

Light-Emitting Diodes (LEDs) are electronic devices that can turn electric energy into light. LEDs are like tiny lightbulbs, but they require less power and last much longer.

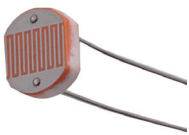
電阻
Resistor



電阻是電子電路中常見的元件，擁有固定不變的電阻值。電阻的運作跟隨歐姆定律，其電阻值定義為其電壓與電流相除所得的比值。電阻常用於限制電流和分壓。

The resistor's resistance limits the flow of electrons through a circuit. The behaviour of an resistor is dictated by the relationship specified by Ohm's law. Commonly resistors are used to limit current and divide voltages.

光敏電阻
Light Dependent Resistor



光敏電阻是會隨着光度而變化的可變電阻。在完全漆黑的環境，光敏電阻的電阻值可以超過一百萬歐姆，隨着光度增加其電阻值會下降到數百、甚至數歐姆。

Light dependent resistors are light-sensitive, variable resistors. In pitch-black conditions, the LDR's resistance will be in the megaohm’s range. As light increases, the resistance will drop to several hundred, or even several ohms.

輕觸開關
Tactile Button

輕觸開關是開關的一種。當其被按下時，電路就會接通。當其被釋放時，電路就會斷開。輕觸開關常見於各種接鍵，例如電腦鍵盤和滑鼠。

Tactile buttons are a special kind of switches. Usually, they are closed when pressed and they are opened when released. Tactile buttons are commonly used in keys or buttons such as computer keyboards and mouse devices.

蜂鳴器
Buzzer

蜂鳴器是產生聲音的信號裝置。蜂鳴器廣泛應用於報警裝置，定時器和作為使用者輸入時的反饋等。

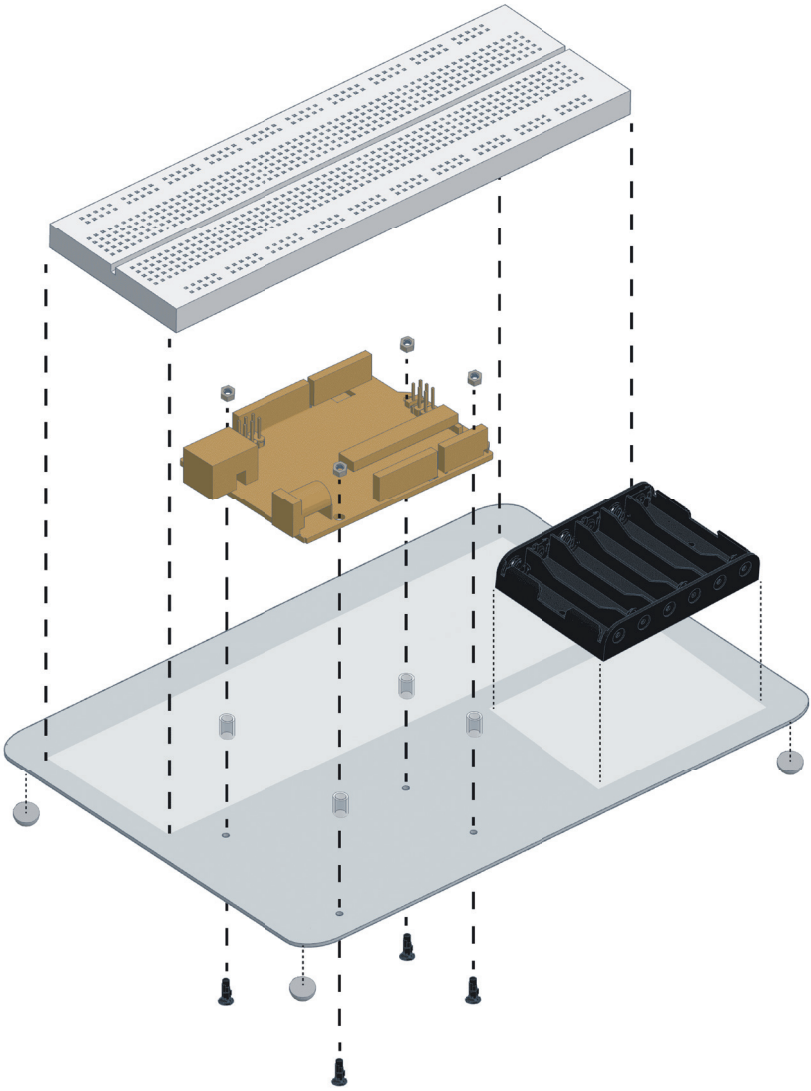
A buzzer is an audio signaling device. Typical uses of buzzers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

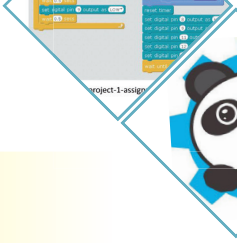
程式語言
Programming Language

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。

Scratch is a free educational programming language that was developed by MIT. It is geared towards kids age 8-16. Users program in Scratch by dragging-and-dropping programming blocks onto each other like jigsaw puzzle.

裝嵌圖
Assembly Diagram





產品特色 Product Features

1. 詳盡自學教程 Detailed Self-learning Tutorial

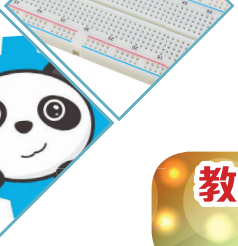
- 資料詳盡，鼓勵自主學習。
  Detailed information is provided to encourage Self-directed learning.
- 涵蓋多個學科的知識和技能，實踐跨學科學習。
  Covers knowledge and skills of various subjects, practises interdisciplinary learning.
- 教程支援電腦、平板及智能手機，方便易用。
  Tutorial supports different devices including computers, tablets and smart phones.
- 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：交通燈模擬器
Project I: Traffic Light Simulation

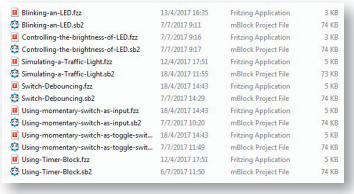
本專案的主旨是讓學生學習在 Arduino 上應用 LED 燈和輕觸按鈕，並用所學來模擬交通燈。

This project allows students to learn how to simulate traffic lights using Arduino board and Scratch programming language. During the process, students would learn how to control LEDs and the use of tactile buttons.

專案資源 Project Resources

自學教材
Self-Learning Guide

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



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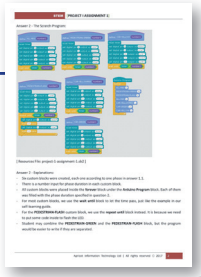
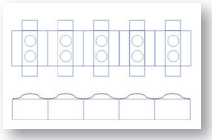
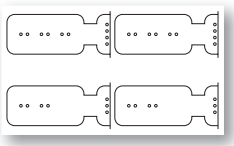
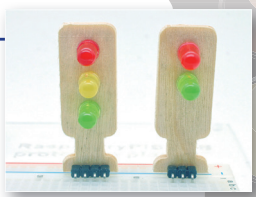
Blinking-an-LED.sb2	7/7/2017 9:11	mBlock Project File	74 KB
Controlling-the-brightness-of-LED.fzz	7/7/2017 9:16	Fritzing Application	3 KB
Controlling-the-brightness-of-LED.sb2	7/7/2017 9:17	mBlock Project File	74 KB
Simulating-a-Traffic-Light.fzz	12/4/2017 17:51	Fritzing Application	5 KB
Simulating-a-Traffic-Light.sb2	18/4/2017 11:55	mBlock Project File	73 KB
Switch-Debouncing.fzz	18/4/2017 14:43	Fritzing Application	5 KB
Switch-Debouncing.sb2	7/7/2017 14:29	mBlock Project File	74 KB
Using-momentary-switch-as-input.fzz	18/4/2017 14:43	Fritzing Application	5 KB
Using-momentary-switch-as-input.sb2	7/7/2017 10:20	mBlock Project File	74 KB
Using-momentary-switch-as-toggle-swit...	18/4/2017 14:43	Fritzing Application	5 KB
Using-momentary-switch-as-toggle-swit...	7/7/2017 11:49	mBlock Project File	74 KB
Using-Timer-Block.fzz	12/4/2017 17:51	Fritzing Application	5 KB
Using-Timer-Block.sb2	6/7/2017 11:50	mBlock Project File	74 KB



DIY 內容
DIY Materials







專案二：音樂燈光匯演
Project II : Music Light Show

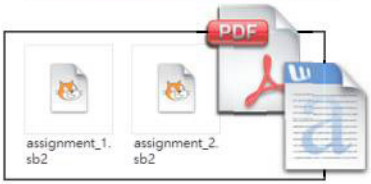
本專案的主旨是讓學生學習使用 Arduino 來創建一個音樂燈光匯演。學生在過程中將會認識蜂鳴器、光敏電阻和 LED 燈的不同閃爍效果。

This project shows students how to create a music light show with Arduino. Students would learn about buzzers, light dependent resistors and LED lighting patterns in the process.

專案資源 Project Resources

自學教材
Self-Learning Guide

資源檔案
Resource Files



建議答案
Suggested Answers

DIY 內容
DIY Materials

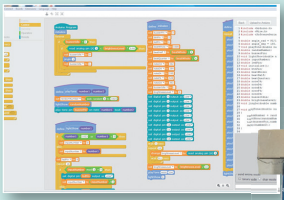
教材和學材均可在專用網站下載：
Teaching and learning materials can be downloaded on the companion website:

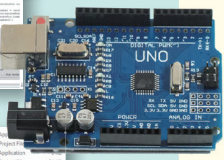
網址 Website：http://www.apricot.com.hk/stemkit/

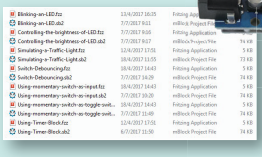
本教學套件為配合教育局推行的STEM教學而設計，適合中小學生使用，學與教材料齊備，方便作課堂教學、專題研習或自主學習之用。

產品特色 Product Features

- 開放源碼的軟硬件 Open-source Software & Hardware
- 詳盡自學教程 Detailed Self-learning Tutorial
- 採用 Scratch 語言教學 Scratch Programming Language is adopted
- 提供活動相關的基礎知識 Relevant Basic Knowledge is provided
- 資源檔案及建議答案 Resource Files & Suggested Answers
- DIY 內容 DIY Materials
- 互動光碟及專用網站 Interactive CD-Rom & Companion Website







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