STEM

Science Technology Engineering Maths

競賽機械教學套件

（搶答機 / 抽獎輪）

Gaming Machine Teaching Kit

(Quiz Buzzer / Lucky Wheel)

- 含豐富的軟硬件資源
  Rich in hardware and software resources
- 採用 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
- 鼓勵學生動手做，選擇最佳的材料來美化個人作品
  Encourage students to build their own work. Many materials can be used to beautify their work
- 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

雅博資訊科技有限公司
Apricot Information Technology Limited

Contents

主要零件
Main Parts

USB 線 / USB Cable

蜂鳴器 / Buzzer

電阻 / Resistor

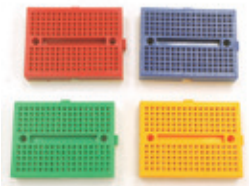
輕觸開關 / Tactile Button

Arduino NANO 兼容主板 / Arduino NANO Compatible Board

連接線 / Jumper Wires

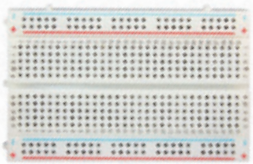
杜邦線 / Dupont cable

170 孔迷你麵包板 / 170 tie points tiny size breadboard



5V LED 帶線帶電阻 / 5V LED with wire & resistor

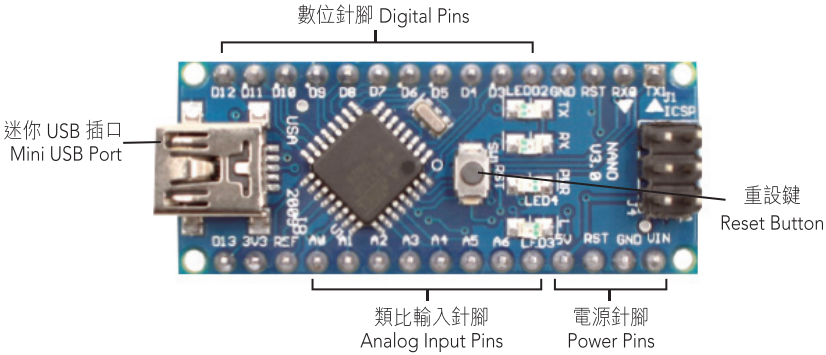
400 孔麵包板 / 400 tie points half size breadboard



發光二極管 / LED

重要零件介紹 Introduction to Major Parts

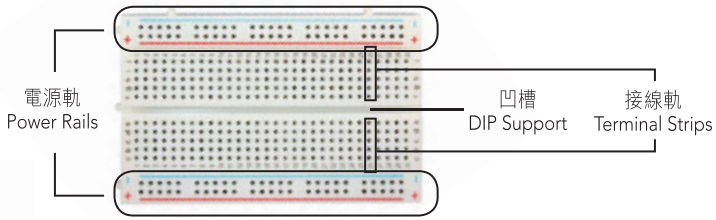
Arduino NANO 兼容主板
Arduino NANO Compatible Board



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.

400 孔麵包板
400 tie points half size breadboard

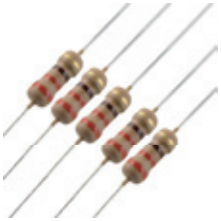


發光二極管
Light-Emitting Dior

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.

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.

杜邦線
Dupont cable

連接線，是指一條或一組的電線，其兩端通常會有特定的連接器。常用於連接麵包上的不同零件，和連接不同的感應器模組。

A jumper wire is an electrical wire, or group of them in a cable, with a connector or pin at each end. They are normally used to interconnect the components of a breadboard or sensor modules without soldering.

5V 帶線帶電阻 LED
5V LED with wire & resistor

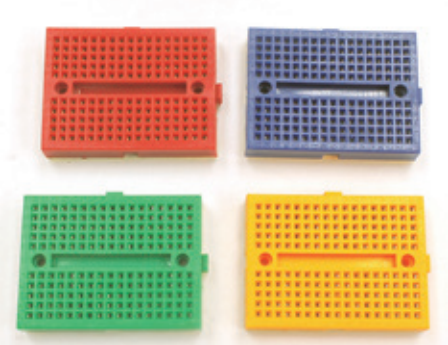
加入了電阻和電線的 LED，令建立電路簡單了不少。但卻因為其電阻值是固定的，所以亦限制了其只能用於 5V 的環境。

With the built-in wires and resistor, it makes building a circuit much easier and faster. But because of the fixed resistor, they can only be used in 5V environment.

170 孔迷你麵包板
170 tie points tiny size breadboard

迷你麵包板的大小只有 400 孔麵包板的一半，而且沒有電源軌。特別適合製作一些簡單的電路。

The tiny breadboard only has half the size of a 400 tie-points half-size breadboard. They are perfect for tiny project.



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. It is geared towards kids age 8-16. 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/)

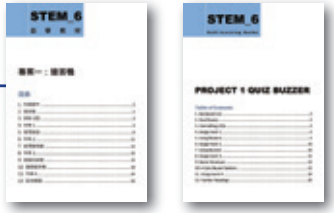
專案一：搶答機
Project I: Quiz Buzzer

使用 Arduino 和 LED、按鈕、蜂鳴器等簡單的電子零件，製作問答遊戲專用的搶答機。

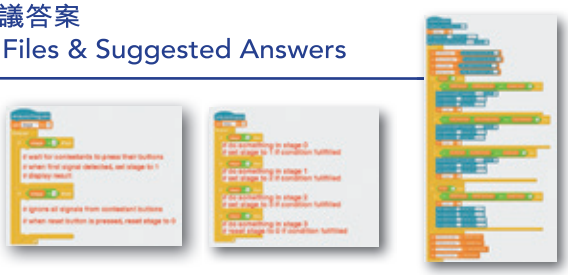
Learn how to use Arduino and simple electronic components such as LEDs, push buttons and buzzer to build a quiz buzzer system.

專案資源 Project Resources

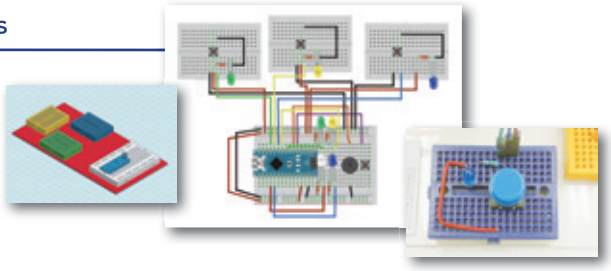
自學教材
Self-Learning Guide



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



DIY 內容
DIY Materials



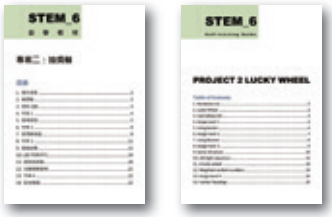
專案二：抽獎輪
Project II : Lucky Wheel

使用 Arduino 和 LED、按鈕、蜂鳴器等簡單的電子零件，來製作抽獎常用的抽獎輪。

Learn how to use Arduino and simple electronic components such as LEDs, push buttons and buzzer to build a lucky draw wheel.

專案資源 Project Resources

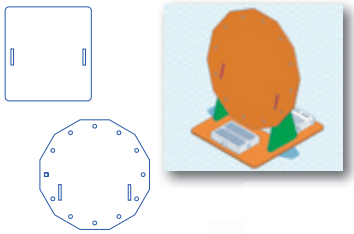
自學教材
Self-Learning Guide



資源檔案
Resource Files

建議答案
Suggested Answers

DIY 內容
DIY Materials



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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