

AI for STEM Competition

## Asia Pacific STEAM\_AI Technology Innovation Challenge

### 03 Screen Display, Motors and Servos

CocoRobo





Part 1

Platform use



Part 2

Image drawing



Part 3

Camera screen  
display



Part 4

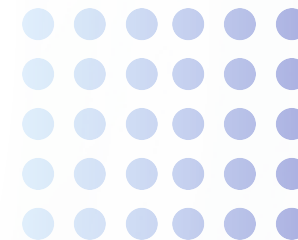
Motor and Servo

# 目 録

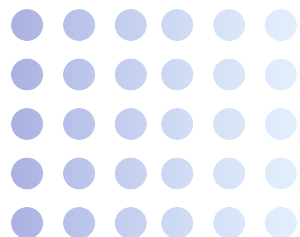
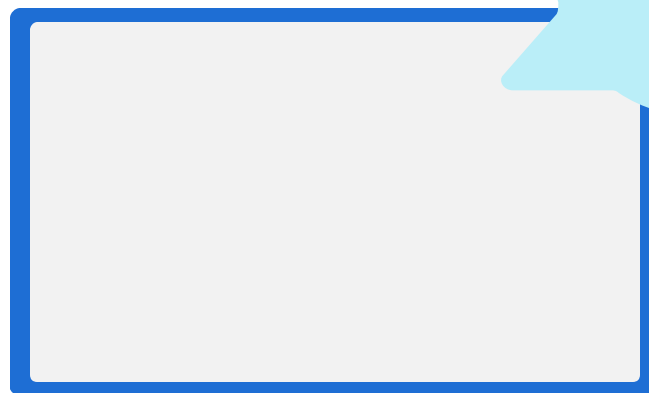
CONTENTS

# ONE.

## Platform Use



<https://pi.cocorobo.hk/>



02

# Platform Use

2

File Access Area

4

Auxiliary Area

The screenshot displays the CocoBlockly Pi web interface. At the top, a blue header bar contains the 'CocoBlockly Pi' logo, a file management section with buttons for '未命名' (Untitled), '保存' (Save), and icons for back, trash, and camera, and an auxiliary area with links for '樣例' (Examples), '實驗室' (Lab), '學習' (Learn), '存儲' (Storage), '語言' (Language), a user profile icon, and a '登入' (Login) button. The main workspace is divided into three primary sections: a left sidebar (1) listing various block categories like '邏輯' (Logic), '循環' (Loops), '數學運算' (Math), '變量' (Variables), '字串' (Strings), '陣列' (Arrays), '字典' (Dictionaries), '元組' (Tuples), '集合' (Sets), '函數' (Functions), '文件' (Files), '時間' (Time), '序列埠通訊' (Serial Port Communication), '基礎硬件' (Basic Hardware), '媒體處理' (Media Processing), '人工智能' (AI), '物聯網' (IoT), and '擴展模組' (Expansion Modules); a central 'Block Programming Area' (3) for assembling code blocks; and a right-hand 'Code/ Interaction Area' (6) for writing and running code. Below the code area is an 'Upload Area' (7) for managing hardware devices, showing a list of devices, a '連接設備' (Connect Device) button, and a '添加設備' (Add Device) button. At the bottom of the upload area are buttons for '運行' (Run), '上載' (Upload), '停止' (Stop), '重啟' (Restart), and '關機' (Shutdown). The footer includes 'CocoRobo LTD © 2023 版權所有' (CocoRobo LTD © 2023 All rights reserved), '更新日誌' (Update Log), '幫助' (Help), and 'CocoBlockly Pi'.

CocoBlockly Pi

未命名 保存

樣例 實驗室 學習 存儲 語言 登入

邏輯  
循環  
數學運算  
變量  
字串  
陣列  
字典  
元組  
集合  
函數  
文件  
時間  
序列埠通訊  
基礎硬件  
媒體處理  
人工智能  
物聯網  
擴展模組

3 Block Programming Area

1 Block Command Area

6 Code/ Interaction Area

7 Upload Area

Python 程式碼 終端交互窗 序列埠數據...

1  
2

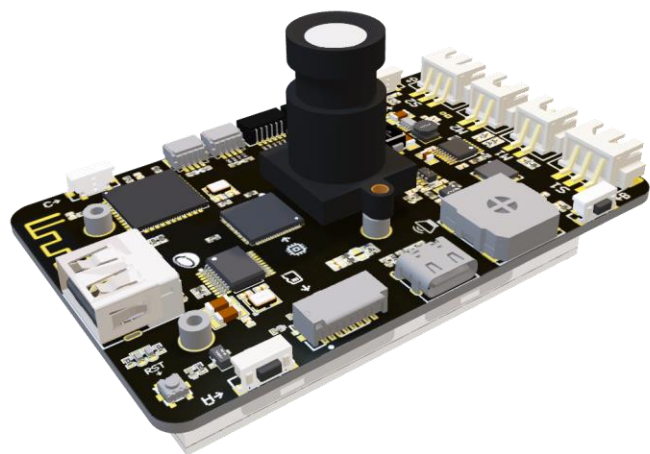
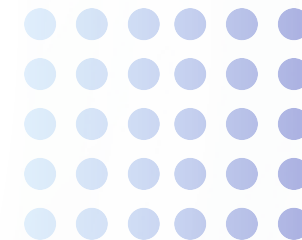
設備 有

模組未連接，請連接。

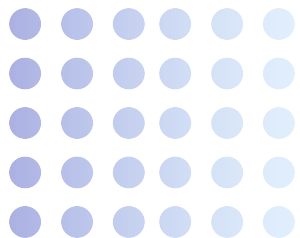
連接設備 添加設備

運行 上載 停止 重啟 關機

更新日誌 幫助 CocoBlockly Pi



**Use a Type-C cable to connect the  
Cocopi module to the computer**



# Platform Use

The screenshot shows the CocoBlockly Pi web interface. On the left is a sidebar with various programming blocks categorized under 'CocoBlock'. The main workspace is divided into two panes: the top pane shows a list of available devices, and the bottom pane shows the code editor and control buttons. A dialog box is open for connecting a device.

**1** Click on the "Add" button

**2** Select the corresponding device

**3** Click the "Connect" button

The dialog box displays the title 'pi.cocorobo.hk 要求連線' and a list of devices. The first device, '不明的 Google Inc. 裝置 - 已配對', is selected. At the bottom of the dialog are buttons for '連線' (Connect) and '取消' (Cancel).

The bottom control bar includes buttons for '連接設備' (Connect Device), '添加設備' (Add Device), '運行' (Run), '上載' (Upload), '停止' (Stop), '重啟' (Restart), and '開機' (Power On). The '添加設備' button is highlighted with a red box.

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更新日誌 幫助 CocoBlockly Pi

# Platform Use

The screenshot displays the CocoBlockly Pi web application interface. On the left is a vertical sidebar with a list of programming blocks: 邏輯 (Logic), 循環 (Loop), 數學運算 (Math), 變量 (Variable), 字串 (String), 陣列 (Array), 字典 (Dictionary), 元組 (Tuple), 集合 (Set), 函數 (Function), 文件 (File), 時間 (Time), 序列埠通訊 (Serial Communication), 基礎硬件 (Basic Hardware), 媒體處理 (Media Processing), 人工智能 (Artificial Intelligence), 物聯網 (IoT), and 擴展模組 (Extension Modules). The '基礎硬件' (Basic Hardware) category is highlighted in orange. The main workspace is currently empty. On the right, a panel shows the 'Python 程式碼' (Python Code) tab selected, with a code editor containing two empty lines. Below the code editor, the '設備' (Device) section is visible, showing a status message '模組未連接, 請連接。' (Module not connected, please connect.) and a '連接設備' (Connect Device) button, which is highlighted by a blue callout arrow. Other buttons in this section include '添加設備' (Add Device), '運行' (Run), '上載' (Upload), '停止' (Stop), '重啟' (Restart), and '關機' (Shutdown). The top navigation bar includes the 'CocoBlockly Pi' logo, a '未命名' (Untitled) label, a '保存' (Save) button, and icons for examples, experiments, learning, storage, and language. The bottom footer contains the copyright notice 'CocoRobo LTD © 2023 版權所有', a '更新日誌' (Update Log) link, a '幫助' (Help) link, and the text 'CocoBlockly Pi'.

Click on the "Connect Device" button to get started

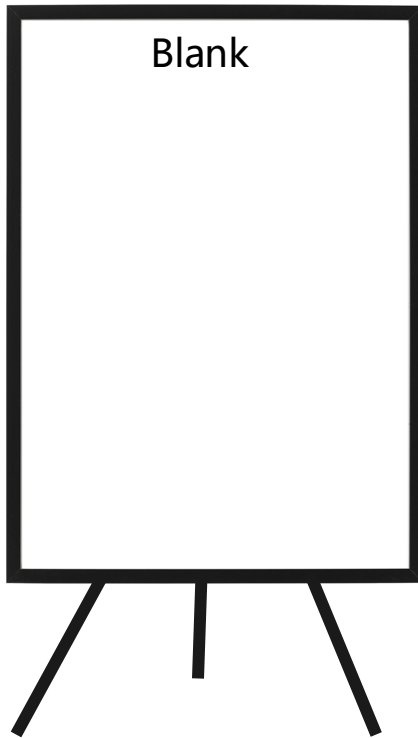


# TWO.

## Image Drawing

## ● Image Drawing

Screen



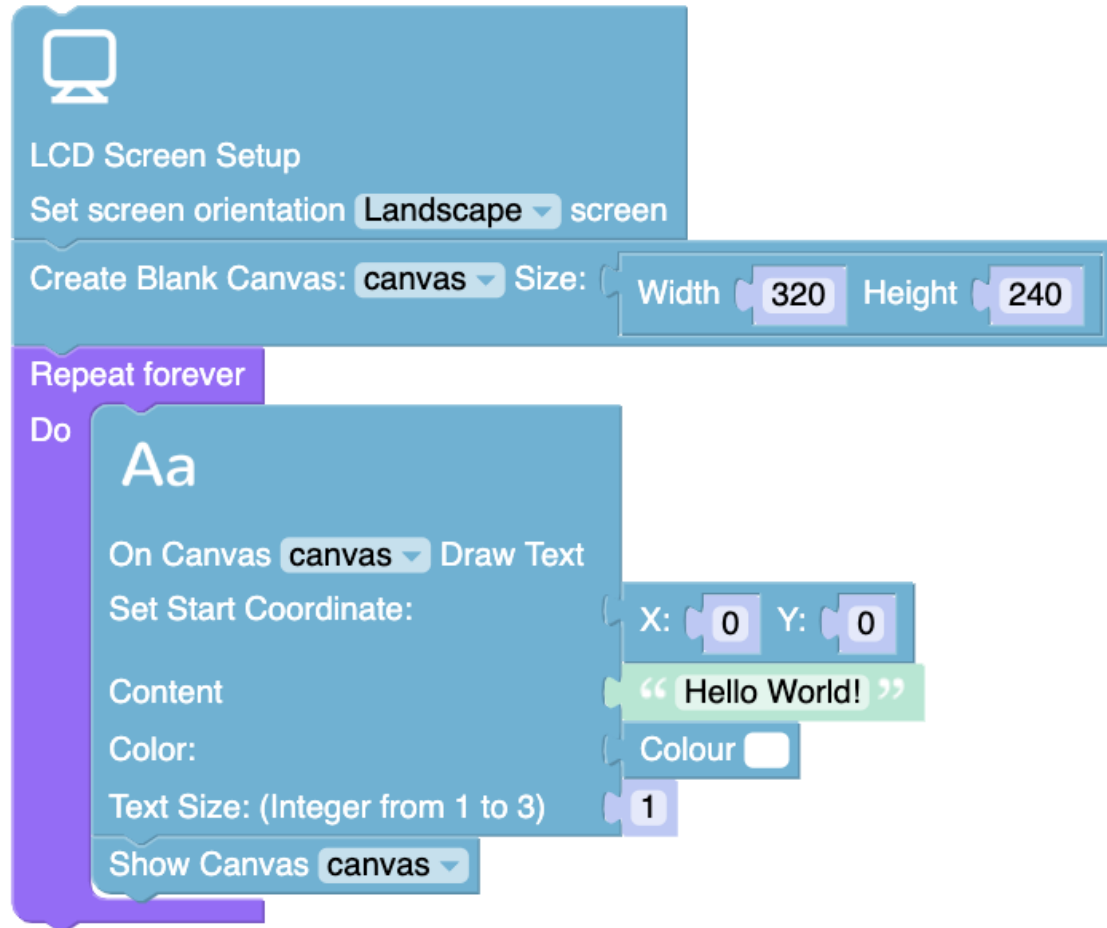
Create a  
canvas



Draw and  
display

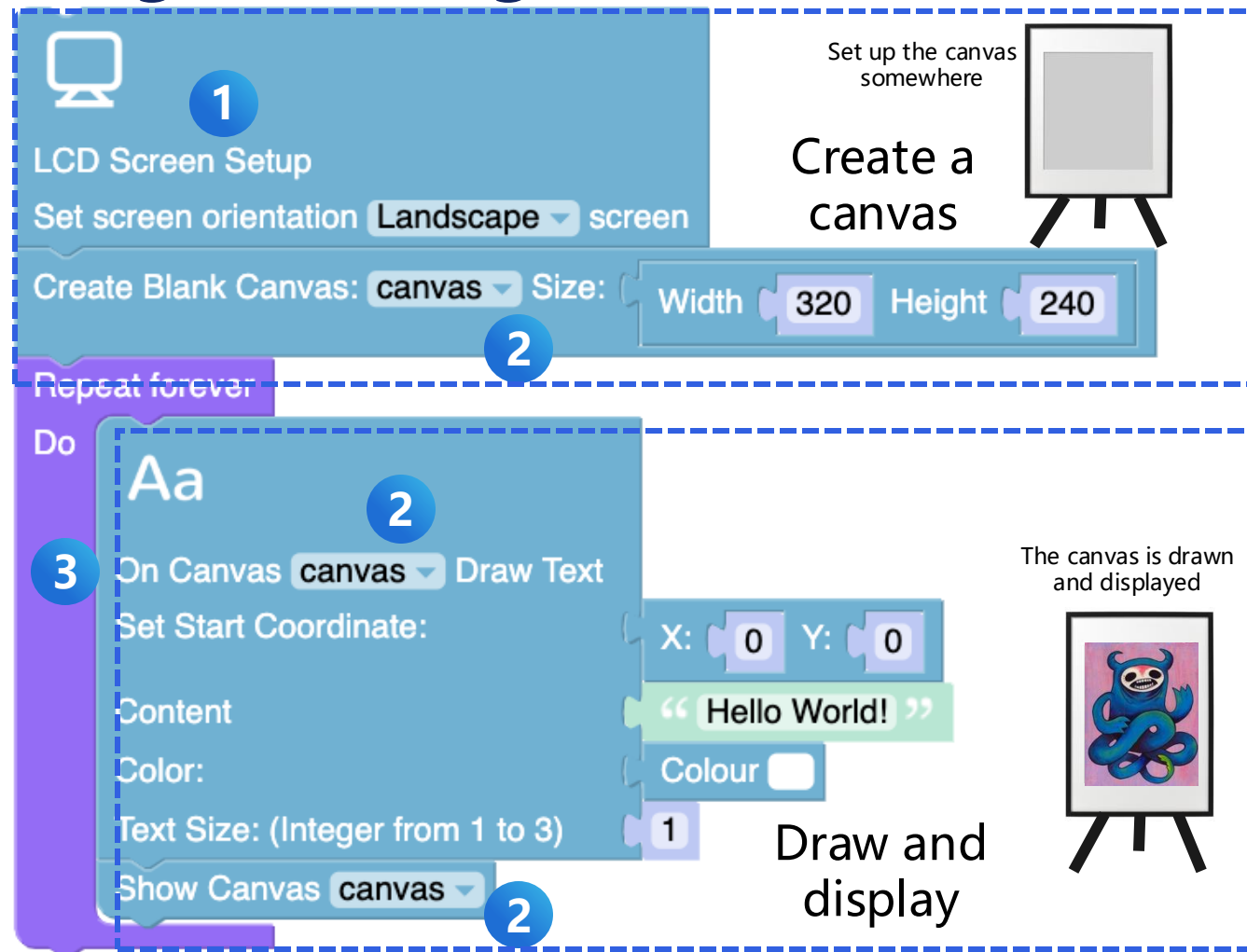


# Image Drawing



Observe the program on the left and talk about what it consists of.

# Image Drawing




- 1 Screen setup
- 2 Canvas
- 3 Repeat

# ● Image Drawing

## The role of the canvas



### Original screen image

The figure drawn by canvas 1 is 

The figure drawn on canvas 2 is 



### ▲ Role 1

Move multiple  
shapes on the  
same canvas  
together



### ▲ Role 2

Resize multiple  
graphics on the  
same canvas  
together



### ▲ Role 3

Clear multiple  
shapes on the  
same canvas  
together

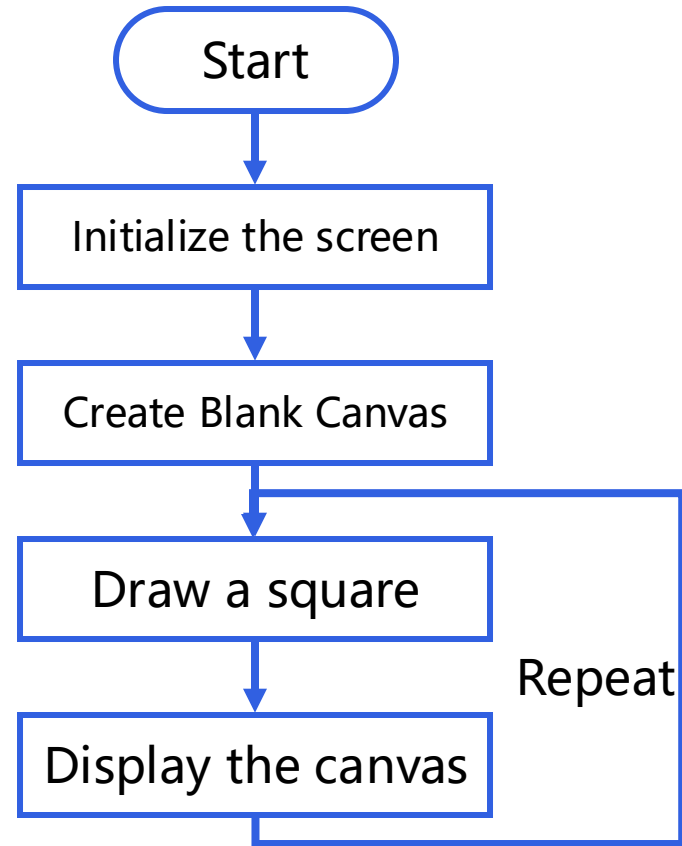


# ● Image Drawing



**Activity 1:** Draw a solid square in the middle of the screen with a size of 50\*50 pixels and make it green colour

Process  
analysis



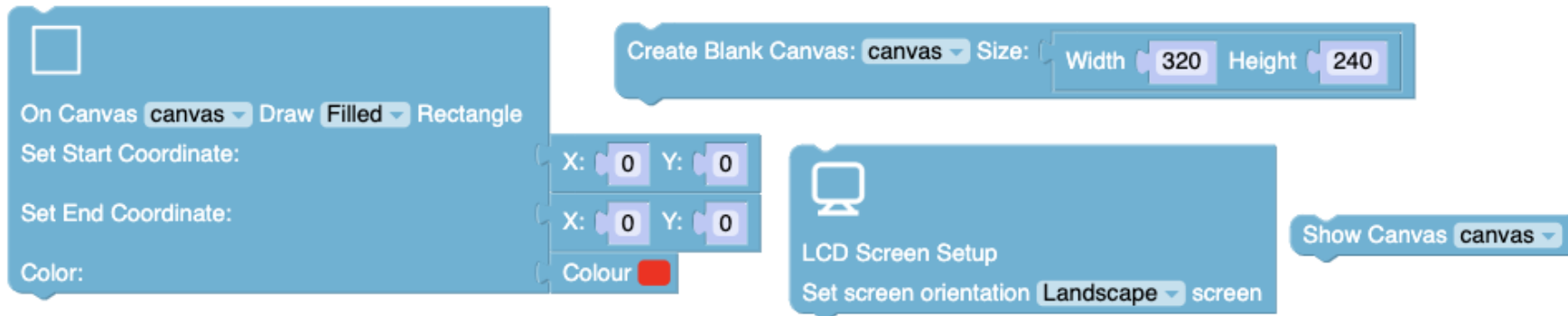
# Image Drawing



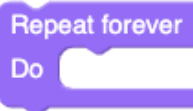
**Activity 1:** Draw a solid square in the middle of the screen with a size of 50\*50 pixels and make it green colour

Usage of  
Block Codes

Screen



Loops





# Image Drawing



**Activity 1:** Draw a solid square in the middle of the screen with a size of 50\*50 pixels and make it green colour

Block  
Explanation

The image shows a Scratch 'Draw Filled Rectangle' block with several annotations:

- Square Settings:** Points to the 'Draw' dropdown menu, which is set to 'Filled'.
- Start Coordinates:** Points to the 'X: 0 Y: 0' input fields.
- End Coordinates:** Points to the 'X: 0 Y: 0' input fields.
- Colour settings:** Points to the 'Colour' dropdown menu, which is set to 'Red'.

The block also includes a 'Color:' label and a color palette.

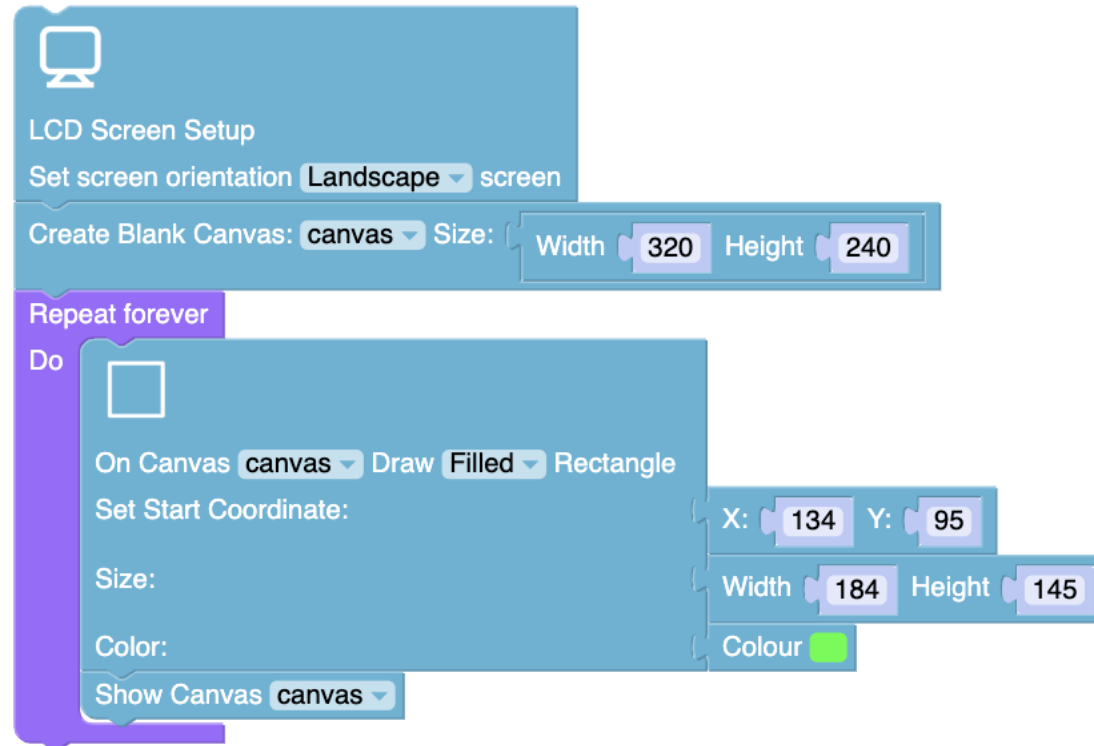
# Image Drawing



## Activity 1:

Draw a solid square in the middle of the screen with a size of 50\*50 pixels and make it green colour

### System Reference



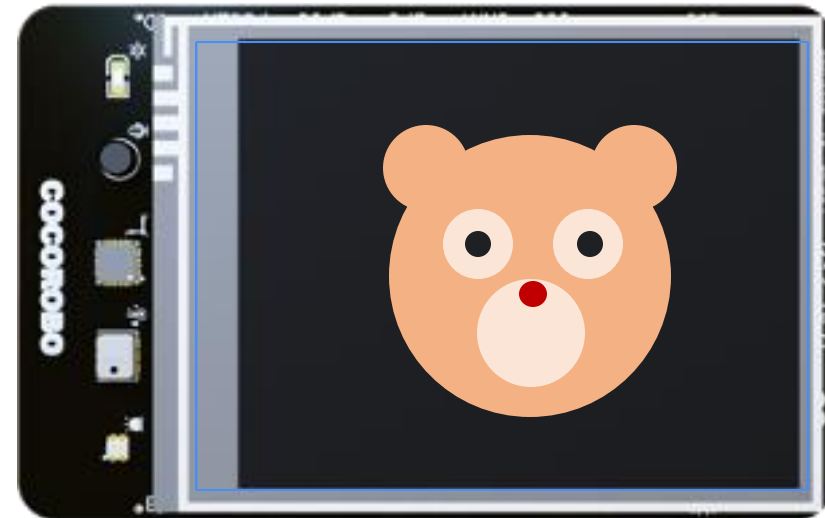
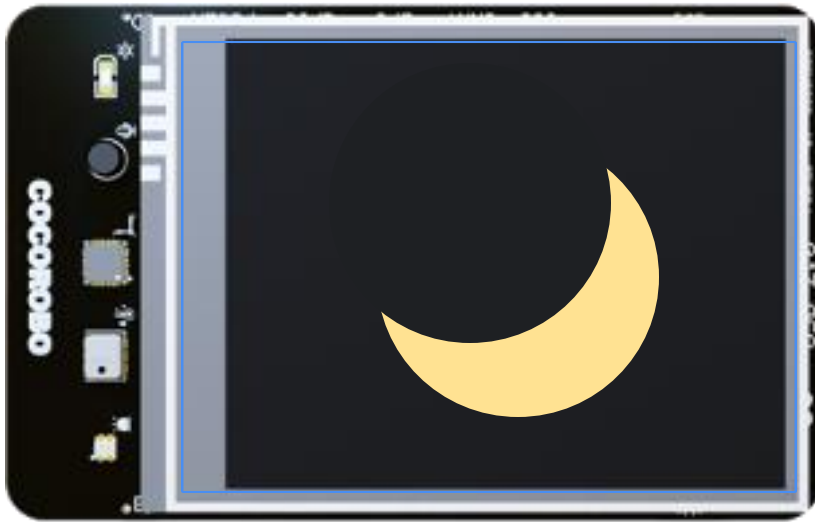
## ● Image Drawing



### Activity 1 (Bonus)

Try to finish drawing the following graphic on the screen:

You can also  
get creative!

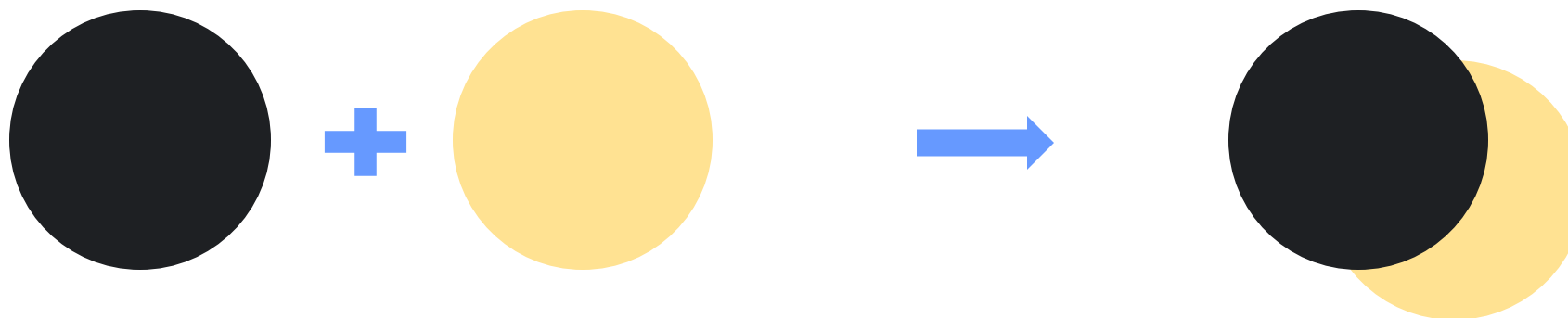


## ● Image Drawing

### Activity 1 (Bonus)

Try to finish drawing the following graphic on the screen:

Reference  
Ideas



# THREE.

## Camera Screen Display

P

O

W

E

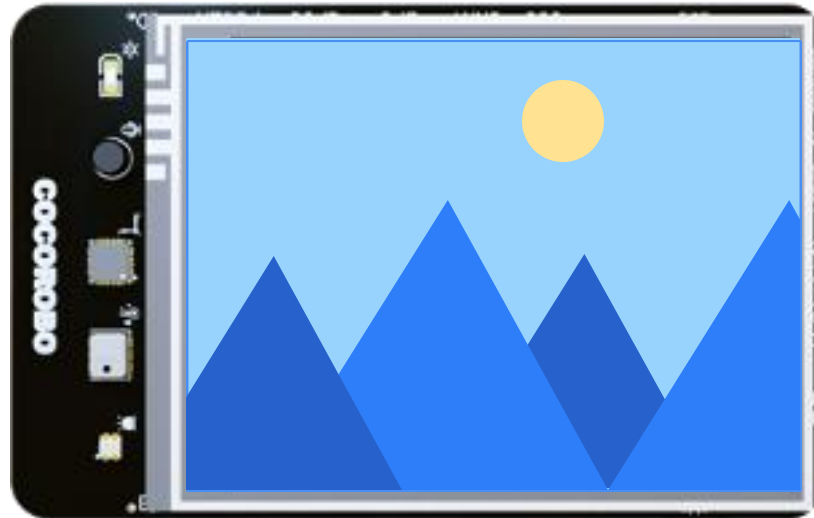


## ● Camera Screen Display



**Activity 2:** Take a picture and keep it on the screen

**Effect**

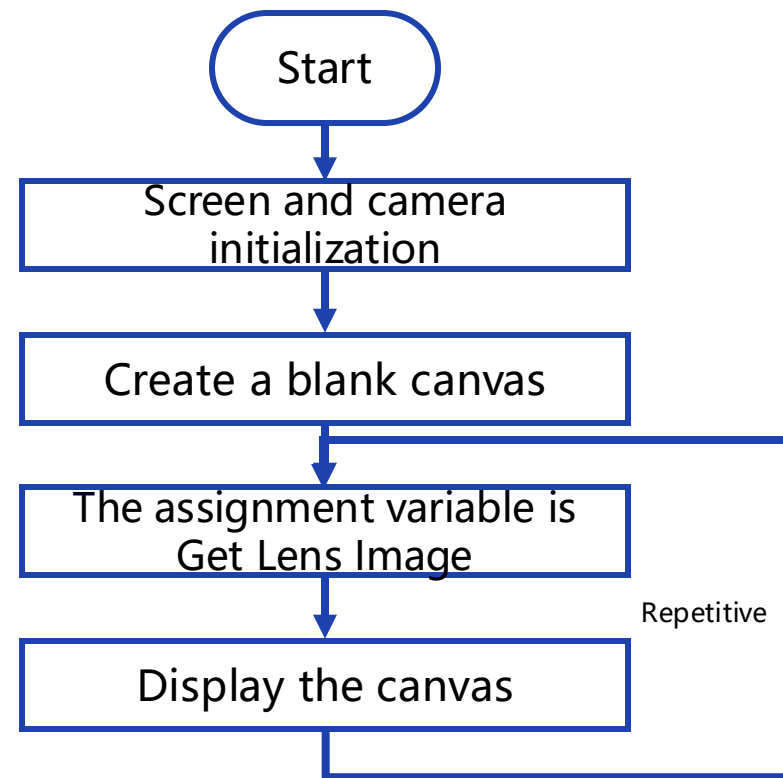


# ● Camera Screen Display



**Activity 2:** Take a picture and keep it on the screen

Process  
analysis

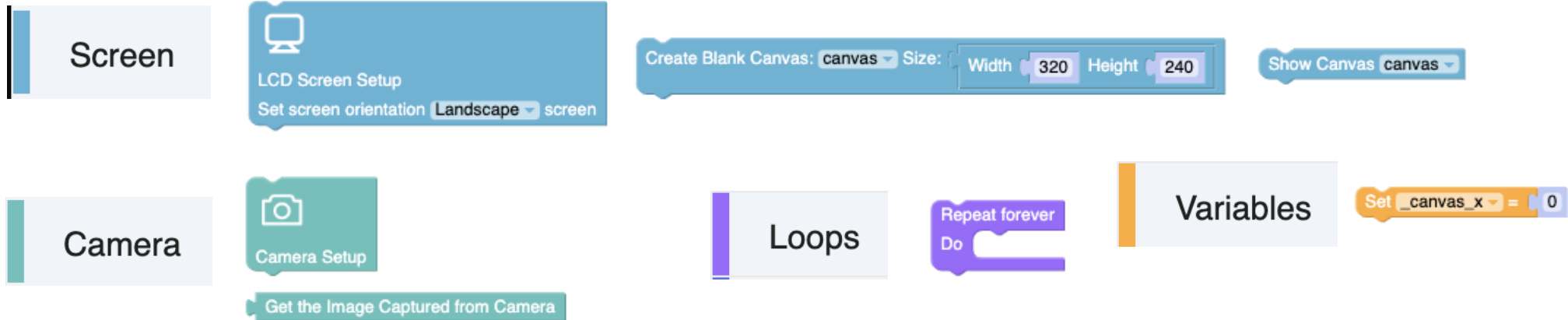


# ● Camera Screen Display



**Activity 2:** Take a picture and keep it on the screen

## Blocks Used



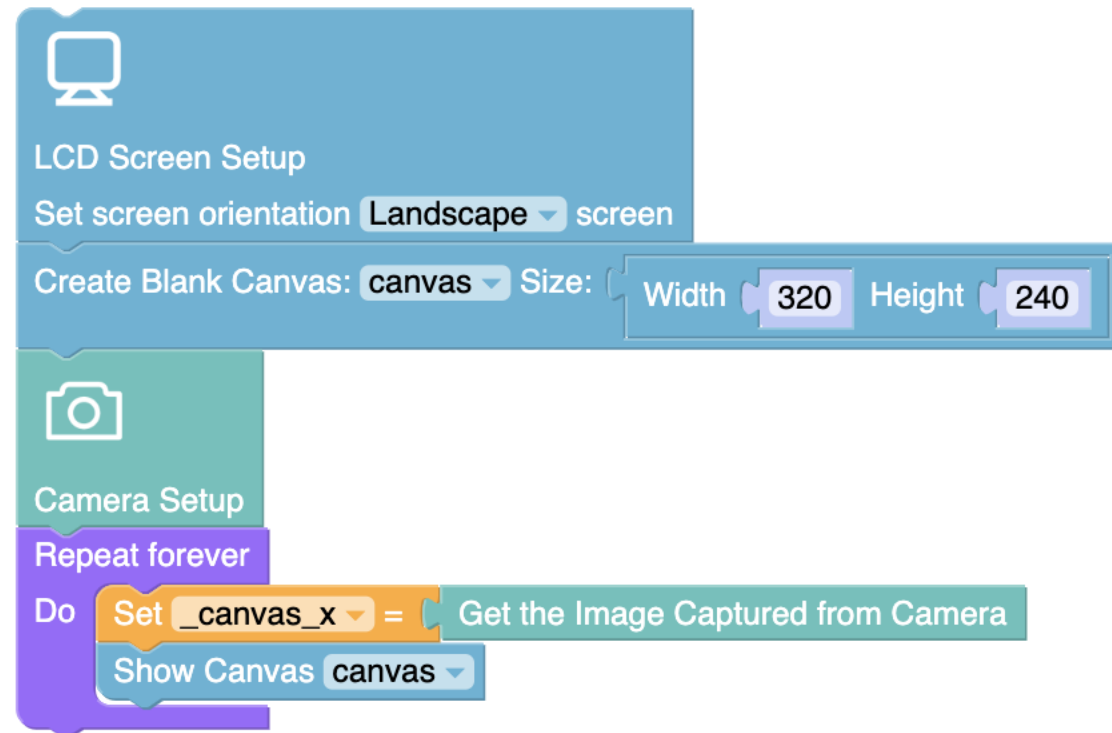


# ● Camera Screen Display



**Activity 2:** Take a picture and keep it on the screen

Block  
Assembly



## ● Camera Screen Display



**Activity 3:** Continuing from Activity 2, press the C button to complete the photo storage function



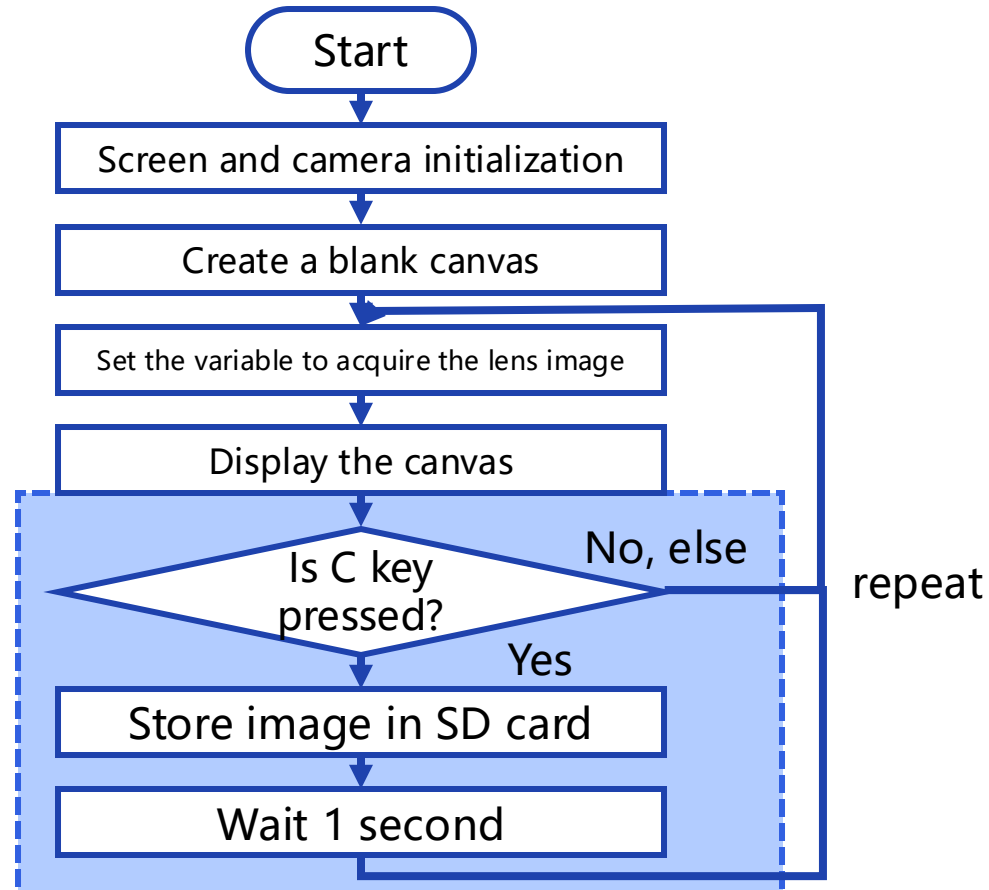
# ● Camera Screen Display



## Activity 3:

Continuing from Activity 2, press the C button to complete the photo storage function

### Block Sequence



# Camera Screen Display



**Activity 3:** Continuing from Activity 2, press the C button to complete the photo storage function

## Blocks Used

### Screen



LCD Screen Setup

Set screen orientation **Landscape** screen

Show Canvas **canvas**

Create Blank Canvas: **canvas** Size: Width **320** Height **240**

Logic



### Camera



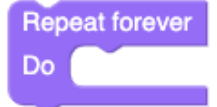
Camera Setup

Get the Image Captured from Camera

Time

Wait **1** Seconds

Loops



### Basic

When Button **A** is Pressed

Image Process

Set Canvas **canvas** Saved to Local Path: **“ /root/user/img/saved.jpg ”**

## ● Camera Screen Display



**Activity 3:** Continuing from Activity 2, press the C button to complete the photo storage function

Block  
Explanation

Set Canvas `canvas` Saved to Local Path: `“ /root/user/img/saved.jpg ”`

`/root/user/img/`

File  
path

Note that the pictures  
are placed under the  
user folder

`saved`

Image  
name

`.jpg`

Image  
Format

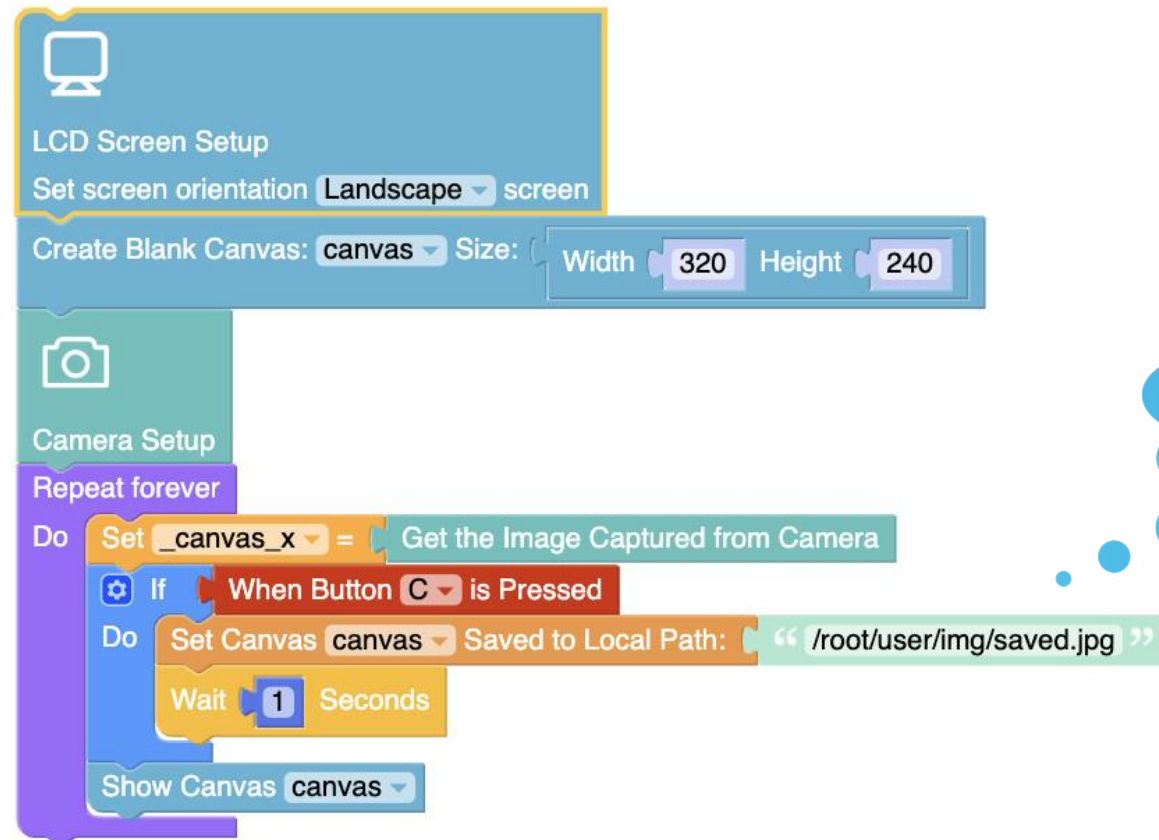
# ● Camera Screen Display



## Activity 3:

Continuing from Activity 2, press the C button to complete the photo storage function

### Block Reference

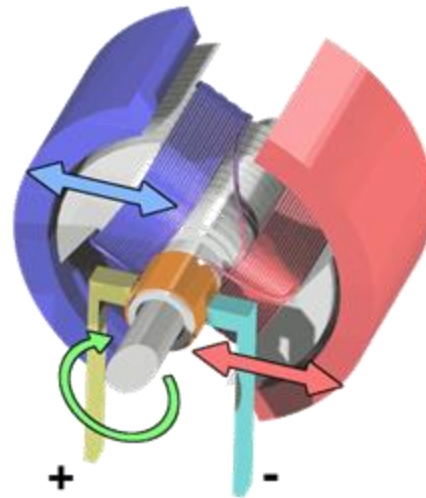
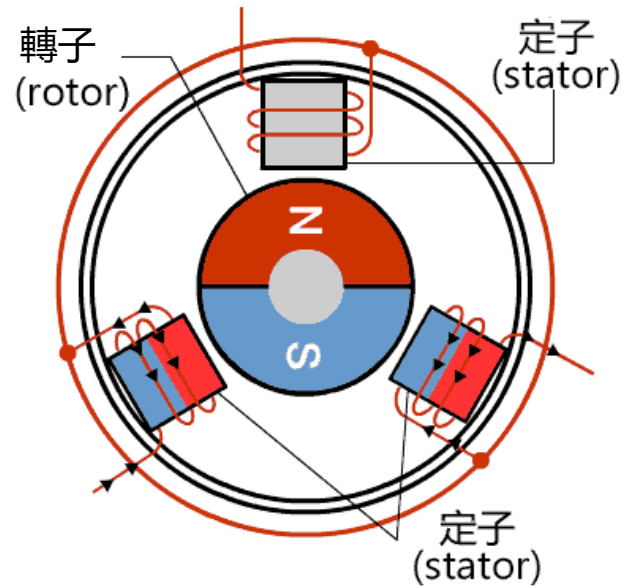


Pay attention when  
modifying the file  
path

# FOUR.

## Motor and Servo

## ● Meet TT Motors



TT motor, also known as electric motor, is an electrical equipment that converts electrical energy into kinetic energy and is used to drive other devices.



## ● Meet TT Motors

DC reducer motor also known as a gear reducer motor, is composed of an ordinary DC motor and a supporting gear reducer.

The function of the gear reducer is to reduce the speed and increase the torque to provide strong power.



## ● Meet TT Motors

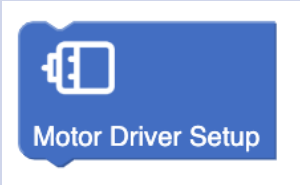
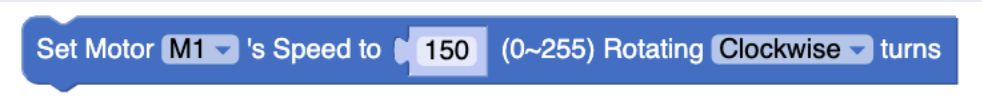
- Rated voltage: 4.5-6V
- No-load speed:  $90 \pm 10$ rpm (depending on the reduction ratio)
- Load Current: 190mA (250mA max)
- Maximum torque: 0.8Kg·cm
- Wire length: 15cm
- TT motor is a DC reducer motor and can be used in DIY scenarios with speed and torque requirements, the speed can be adjusted which can recognize forward and reverse rotation with low noise.



# Usage of TT Motors

Instruction  
Description

Power

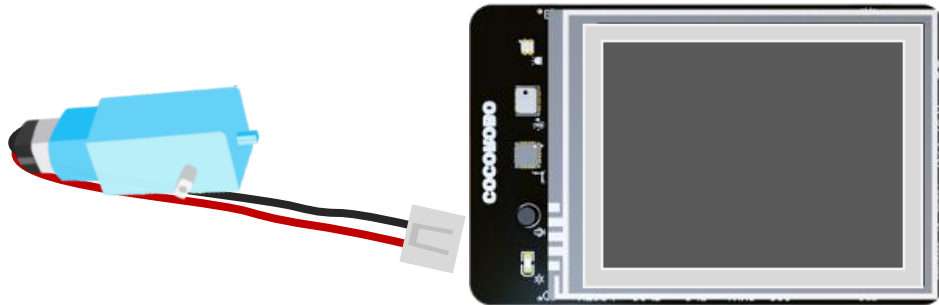
Block Icon	Introduction
 The icon shows a blue block with a white motor symbol and the text "Motor Driver Setup".	Initializes the TT motor
 The icon shows a blue block with the text "Set Motor M1's Speed to 150 (0~255) Rotating Clockwise turns".	Set the specified number for the TT motor to rotate at a certain speed/direction

# ● Power on the Motor



**Activity 1:** Rotate the TT motor clockwise at a speed of 50.

Connect the module to the  
TT motor



Use  
blocks



Motor Driver Setup

Set Motor **M1** 's Speed to **150** (0~255) Rotating **Clockwise** turns

## ● Power on the Motor



**Activity 1:** Rotate the TT motor clockwise at a speed of 50.

Block  
Reference



Motor Driver Setup

Set Motor **M1** 's Speed to **150** (0~255) Rotating **Clockwise** turns

# ● Servo Motors Introduction

## “Servo Motor”

A servo motor is a motor that acts according to commands.

The servo motor can recognize its position and control its action speed.

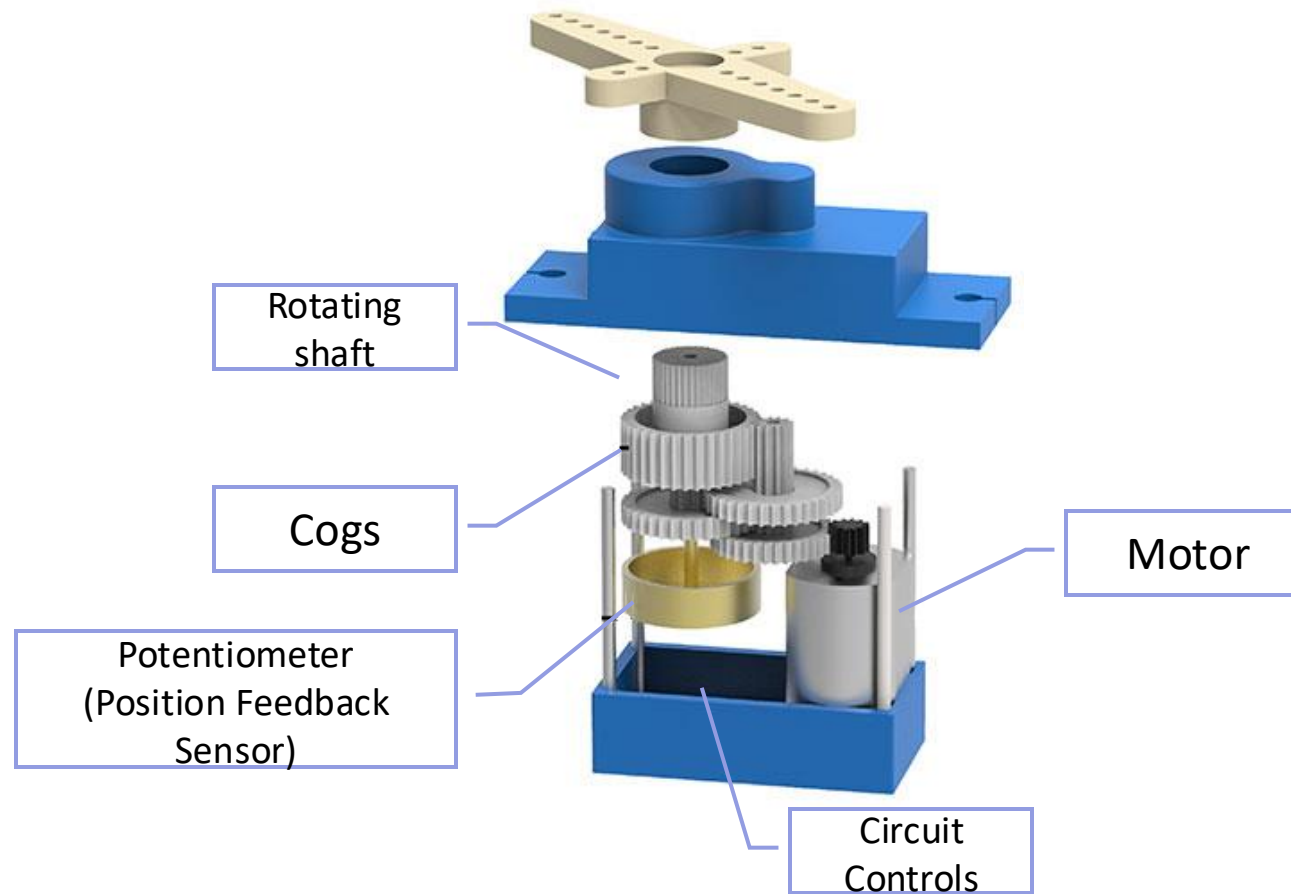


▲ SG90 Servo Motor



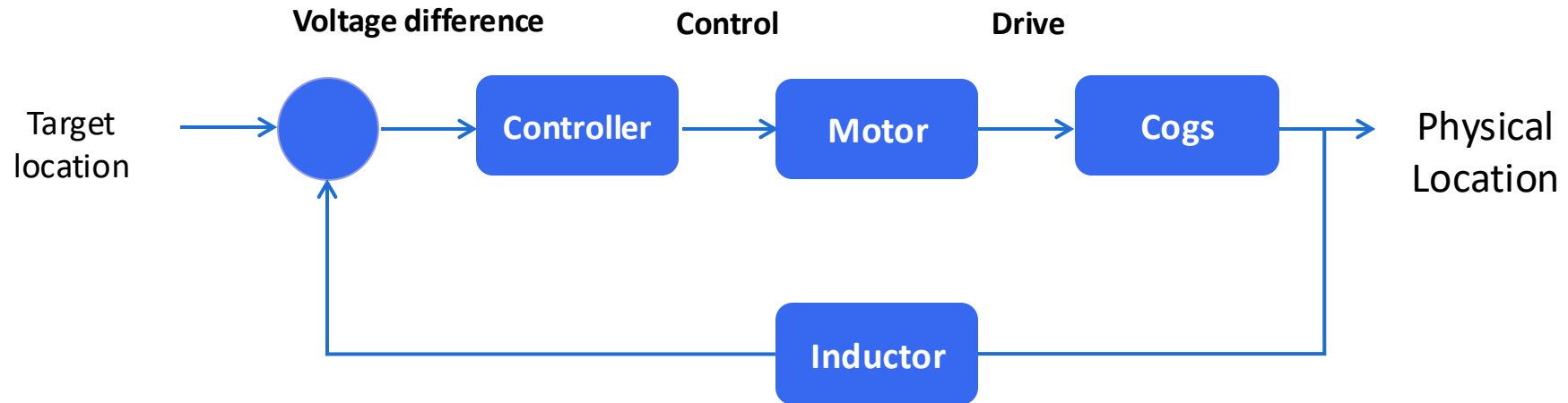
▲ MG995 Servo Motor

# ● Servo Motors Introduction



圖源: <https://learn.thestempedia.com/wp-content/uploads/2018/05/Servo-Motor.jpg>

## Servo Motors Introduction



The position detector (angle sensor) is its input sensor, and the resistance value of the position detector will change the position of the servo motor rotation. By reading the resistance value in the control circuit, the speed and direction of the motor can be adjusted appropriately according to the resistance value, so that the motor rotates at a specified angle. This enables precise rotation control of the servo motor.



# Servo Motors Introduction

Combine the servo motor with either servo motor arm.

What is the maximum angle range of the servo motor that is turned by the rudder arm?

Servo Motor  
Arm



▲ Servo motors and accessories



▲ Servo motor plus arm

# Servo Motors Introduction



**Use a Type C Cable to connect the module to the computer**

# Servo Motors Introduction



**Activity 2:** Control the servo motor to rotate between 0 and 90 degrees.

Block  
Explanation

Power



Set Servo on GPIO # **S1** Rotate to **90** Degree (0°~180°)

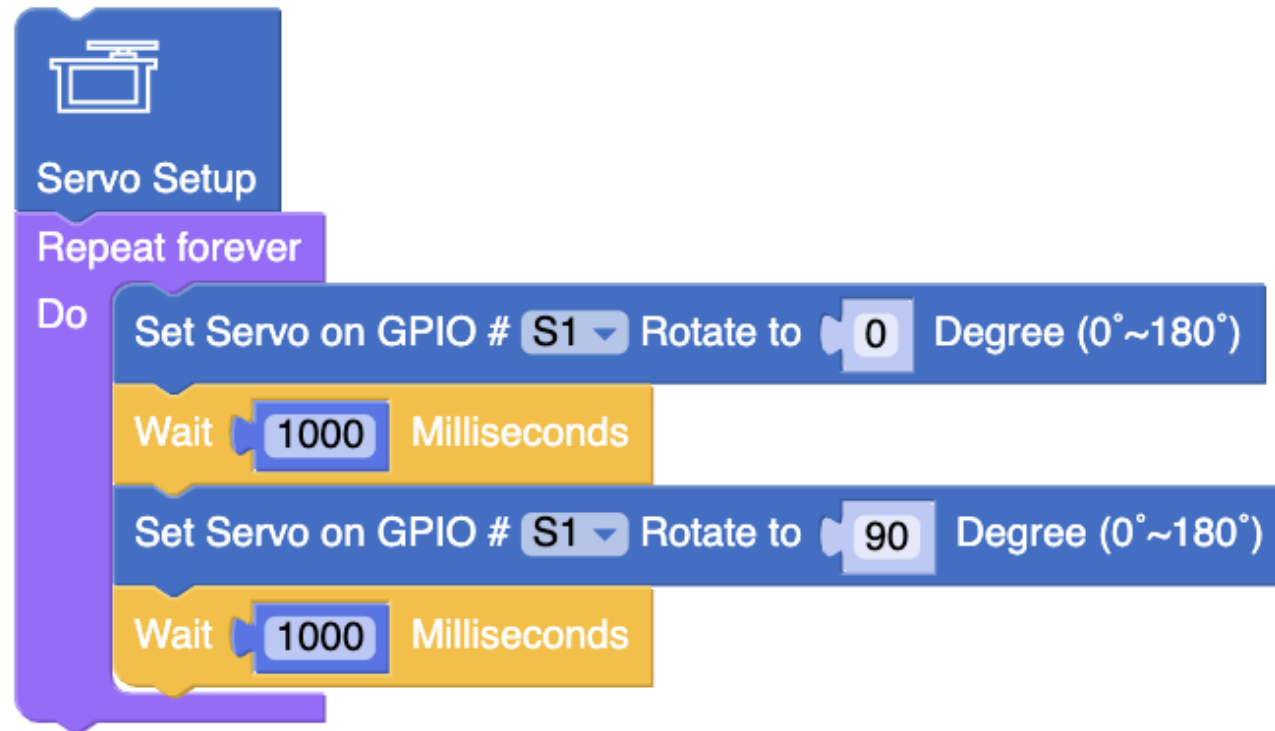
The pin corresponds to the serial number of the signal port on the module

# Servo Motors Introduction



**Activity 2:** Control the servo motor to rotate between 0 and 90 degrees.

Block  
Reference



P O W  
E  
See you!

T H A N K S

P  
J U S T L E A V E P R E S E N T A T I O N T O O R I N

