

創意編程 設計大賽 2022/23

Creative Coder Competition



Installation Design(ID) Rules and Guidelines

合辦機構 Co-organizer



香港青年協會
the hongkong federation of youth groups



Department of Electrical and
Electronic Engineering
電機電子工程系

資助機構 Funding Organisation

π 創新科技署
Innovation and Technology Commission

1}<Question Highlights>

Theme: Disaster Fighter – Building a Sustainable City

- 1.1 Participating team will each write a programme on Arduino/ micro:bit/Raspberry Pi (only for senior secondary division) microcontrollers and create a device or model(s). The device/model should propose innovative solutions on helping city against natural disaster, and creatively demonstrate the concepts or function of a sustainable city under climate change.
- 1.2 The Installation Design (ID) must be relevant to 1 to 3 designated Sustainable Development Goals (SDGs), including “Industry, Innovation and Infrastructure”, “Sustainable Cities and Communities” or “Climate Action”
 - Sustainable Development Goals (HK)
<https://edu.unicef.org.hk/zh-HK/global-goal>
 - 17 SDGs: Scratch Games, Box Games, Presentations
<https://sites.google.com/view/sustainabledevelopmentgoalsact/17-sustainable-development-goals-presentation-scratch-game-sdgsbox-ga>
- 1.3 Teams can create a single/multiple devices, or device(s)/model(s) that incorporate single/multiple scenario(s), which match with the theme and question required this year
- 1.4 The team can create their own Installation Design with various methods and materials to meet the requirements of the theme and question. Installation Design with environmentally friendly materials can obtain higher scores.

2}<Site>

2.1	A maximum of 5 team members can enter the Team Performance Area to introduce or present their Installation Design
2.2	The maximum size of the Installation Design is limited to 0.6m(W) x 1m(L) x 1m(H)
2.3	A 0.6m aisle space from the Installation Design Area will be reserved for each team as Team Performing Area. If space permits, the team may also perform outside the Team Performing Area under safe conditions (See Fig. a). The signages of the Installation Design Area and Team Performing Area will be displayed
2.4	The Secretariat will arrange tables for teams to place their Installation Design in the Installation Design Area, while teams are not allowed to move the tables. For teams that opt to place their Installation Design on the floor, please inform the Secretariat one week before the Competition, and once confirmed, no table will be arranged for these teams on competition day
2.5	All device(s)/model(s) must be placed on the tables/ floor inside the Installation Design Area, but it is not allowed to be bonded to the tables/floor
2.6	The team may put their personal belongings under the tables, which will not be scored. No valuables should be placed or stored under the tables at all time
2.7	To distinguish between teams, the Secretariat will display relevant team details (including school name, team number and division) at the Installation Design Area. Teams are not allowed to remove these details throughout the whole competition

2.8	No electricity will be provided inside the Team Competition Site. If needed, the team may charge their device(s) and laptop(s) at the designated charging zone. Only 3 rectangular pins plug sockets will be provided, while USB recharging is not supported
2.9	All lights inside the competition site will be turned on at all time
2.10	Team instructors may not enter Team Competition Site when teams are preparing and assembling their installation
2.11	The team must clean up the Installation Design Area and Team Performing Area after the competition
2.12	Internet connectivity will not be provided at the competition site. If necessary, please prepare your own online hotspot
2.13	Extendable parts of the Installation Design, if any, must not exceed 30cm after full extension
2.14	If the Installation Design includes a device that shoots out item(s), the shooting range must not exceed 30cm. Relevant items must not be in liquid or gas state, and these items must land inside the Installation Design Area or Team Performing Area
2.15	If any chemicals are used during the competition, teams are required to follow the below safety guidelines of Education Bureau, and submit the list of chemicals to the Secretariat 2 weeks in advance via Email. The notice would be made by the Secretariat on whether the list is approved 1 week before the competition *Handbook on Safety in Science Laboratories; EDB : http://cd1.edb.hkedcity.net/cd/science/laboratory/safety/SafetyHandbook2013_English.pdf

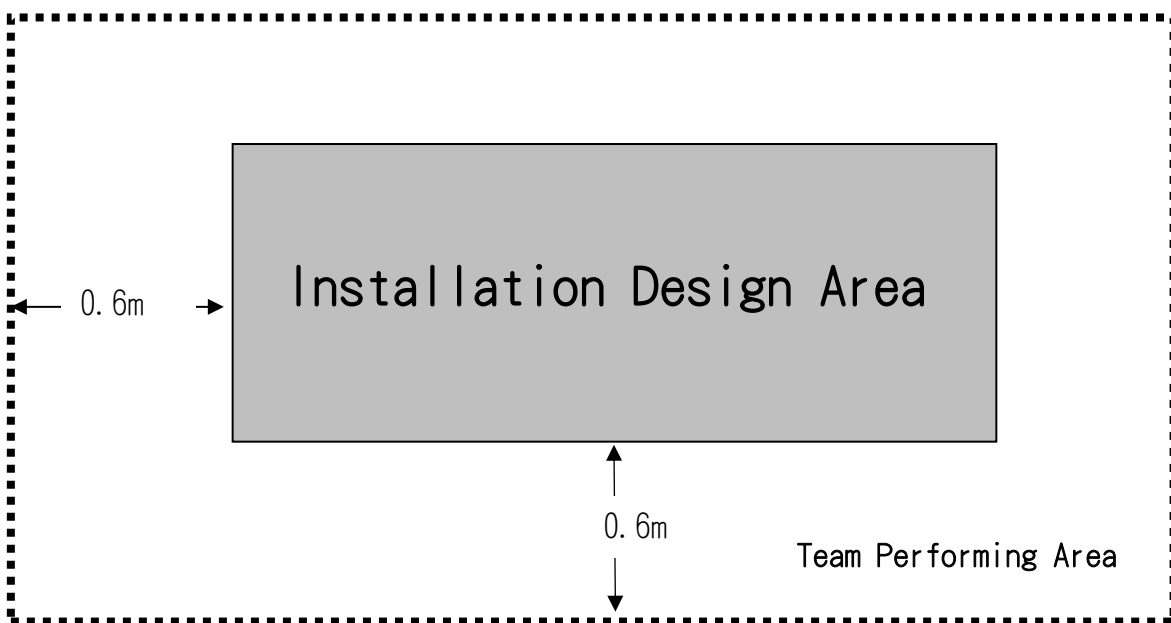


Figure A : Team Competition Area

3}<Sketch>

- 3.1 Team must upload a sketch of their Installation Design on enrolment system on or before 3 July 2023. If there is problem when uploading the document(s), please send it to creativecoder@hkfyg.org.hk. The Installation Design must be original and any

plagiarism will be disqualified

- 3.2 The sketch should be saved as PDF and includes:
- (a) At least one clear photo that shows the finished Installation Design
 - (b) Team details (school name, division, team number)
 - (c) Name of the Installation Design
 - (d) Introduction of the Installation Design
 - (e) The overall expected effect the Installation Design
 - (f) Source code and effect elaboration (including used item(s))
- 3.3 Arduino/ micro:bit programmes used and their associated effects (Please refer to Appendix 2)
- 3.4 Words of the sketch should not exceed 300 words
- 3.5 If Raspberry Pi is used, please upload .py file on enrolment system and no need to include source code on the sketch

4}<Materials>

4.1	Only the following microcontrollers may be used in the competition:
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Senior primary, junior secondary and senior secondary divisions

Arduino:

Arduino (Genuino) UNO series	Arduino Leonardo	Arduino (Genuino) 101	Arduino Nano
Arduino (Genuino) MICRO	Arduino Leonardo ETH	Arduino (Genuino) Mega 2560	Arduino Mø
Arduino (Genuino) ZERO	Arduino Mini	Arduino Ethernet	Arduino Industrial 101
Arduino Yún	Arduino Due	Arduino Gemma	Arduino Mø Pro
Arduino Yun Mini	Arduino MKR1000	Arduino Primo	Arduino Fio
Arduino Pro	Arduino Star Otto	Arduino Tian	Arduino Yún Mini
Arduino UNO WiFi	Arduino MKR Zero	Arduino MKR WiFi 1010	Arduino Pro - Portenta H7
Arduino Pro - Portenta X8	Arduino Pro - Portenta C33	Nicla Vision	Nicla Sense ME
Nicla Voice	Nano Series	MKR Series	

micro:bit:

micro:bit	micro:bit V2	micro:bit V2.2
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Senior secondary division

Raspberry Pi:

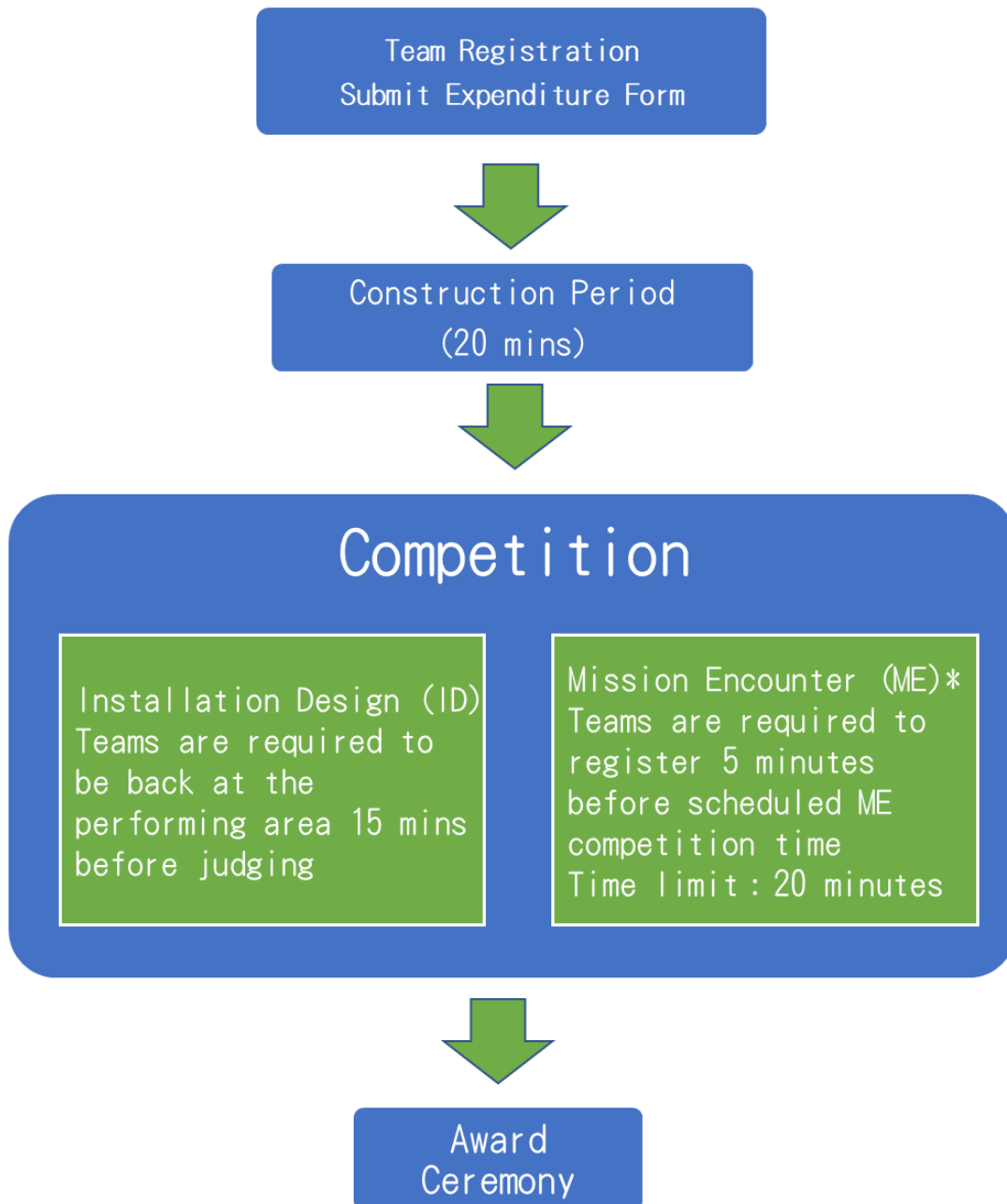
Raspberry Pi 1, Model A & Model B	Raspberry Pi, Model B+	Raspberry Pi 1, Model A+	Raspberry Pi 2, Model B
Raspberry Pi Zero	Raspberry Pi 3, Model B	Raspberry Pi Zero W	Raspberry Pi 3, Model B+
Raspberry Pi 3, Model A+	Raspberry Pi 4, Model B	Raspberry Pi 400	Raspberry Pi Pico
Raspberry Pi Zero 2 W	Raspberry Pi Pico W		

4.2	Maximum number of microcontrollers to be used in the Installation Design:	
	Senior secondary division	6

	Junior secondary and senior primary division	6	
4.3	The team may only use official Arduino/ micro:bit products. Non-genuine products are not allowed to use		
4.4	The team may use shields and/or modules in the Competition, but only as supplementary components instead of individual programming components		
4.5	The total expenditure for all electronic components used in the Installation Design (including microcontrollers, shields, modules etc.) among junior secondary and senior primary divisions should not exceed HK\$1,560 (US\$200). The total expenditure for all electronic components used in the Installation Design (including microcontrollers, shields, modules etc.) among senior secondary division should not exceed HK\$3,120 (US\$400). The team is required to submit an expenditure form to the Secretariat detailing the electronic components used and their relevant costs on or before the competition day		
4.6	The team may place one laptop inside the Installation Design Area as power supply, which will not be scored as part of the Installation Design. Teams of senior secondary division can process AI function by one laptop		
4.7	No laptop or microcontroller will be provided to teams on the competition day		
4.8	If the team has any enquiry regarding the eligibility of using shielding and module or electronic components in the competition, he or she could send a clarification email to the Secretariat at least 1 week before the competition day. If any inappropriate shielding, module or electronic components is used during the competition, respective part(s) would not be scored		

5}<Competition Schedule>

5.1	<p>Registration and Construction</p> <p>(a) Teams are required to arrive at the competition site for registration 10 minutes before the construction period</p> <p>(b) Teams may have 20 minutes for construction. Team members are not allowed to communicate with outside assistants during the construction period</p> <p>(c) If teams enter the competition site during the construction period, they will be able to construct the work until the end of the construction period</p> <p>(d) If the construction period is started and teams do not register within 20 minutes, the team would be disqualified</p>
5.2	<p>Judging</p> <p>(a) Teams are required to register at the performing area 15 minutes before judging</p> <p>(b) Teams will have 10-minute for final adjustment. Secretariat staff would notify teams 5 minutes before judging</p> <p>(c) Teams will have 7 minutes to present their work to the judges. Secretariat staff would notify teams and judges 1 minute before the end of judging. Teams need to immediately stop their presentation when the time is up</p> <p>(d) There are 5-minute Q&A sessions after the presentation. Judges would ask teams to elaborate their programming details, as well as the sketch</p>
5.3	Rundown of the competition as follows :



*Mission Encounter (ME): Teams are required to complete challenging questions. For details, please refer to “Creative Coder Competition 2022/23 Mission Encounter (ME) Instruction”.

6<Scoring>

Requirements of Device, Programming and Theme (140/160 分)

Items	Contents	Score
Hardware Requirements	Electronic components used in the Installation Design: LDR/Potentiometer/built-in accelerometers/Servo motor/LED /motor/Ultrasonic sensor/Speaker or buzzer (5 scores for each component)	0/5/10/15/20
Programme Requirements	Code used in the Installation Design: Conditionals/Variables/Math/Analog input or output/repetition (5 scores for each component)	0/5/10/15/20

Items	Contents	Score
Missions	The diversity of overall effects with demonstration of natural disaster scenarios and corresponding solutions 城市中天然災害的場景及造出應對裝置的效果展現多樣性	0-20
	The creativity of ways to help/solve related disasters 幫助/解決相關天然災害的方法創意度	0 - 20
	The practicality of ways to help/solve related disasters 幫助/解決相關天然災害的方法實用度	0 - 20
The usage of environmentally friendly materials to create thematic effects 隊伍在作品中使用環保物料造出主題效果		0 - 10
The effectiveness of AI utilization (available for senior secondary division only) 使用 AI 有效性 (只適用於高中組)		0 - 20

Teamwork (30 分)

Item	Score
Team spirit (e.g. overall engagement of the team) 團隊合作質素 (如：隊伍整體投入程度)	0 – 30 分

7}<Award>

7.1 The awards for each category are shown below:

Awards	Criteria	Quota
Golden Award	Team with the highest scores	1
Silver Award	1 st running up	1
Bronze Award	2 nd running up	1
The merit of Thematic Award	Except for the 3 top winners, the team obtain the	1

	highest total scores among missions, use of environmentally friendly materials and use of AI	
The merit of Creative Presentation Award	Except for the 3 top winners and winner of the merit of thematic Award, a team with creative presentation skills as selected by judges	1
Team Spirit Award	The team obtains the highest score in teamwork	1

8}<Penalty>

8.1 If any of the following situation arises, penalties will be assessed to teams with reference to the degree of violation:

Item	Penalty
Using dangerous items such as fire, corrosive chemicals, high voltage power components (>15W)	Disqualified
Performing dangerous actions, e.g. damaging the competition site, posing dangers to own team and other people	Disqualified
Unsportsmanlike behavior e.g. deliberately destroying others' work or attacking other teams verbally (Each offense)	10 to 20 scores
Exceeding the size limit of the Installation Design Area (1 score for each 5cm)	1 to 10 scores
Incorporating living organisms in the Installation Design (Each offense)	10 scores
Late submission/failure to submit a sketch to the Secretariat	5 or 10 scores

9}<Notes to Teams>

- The Installation Design must be original work. All Arduino microcontrollers, shields, modules and other electronic components used must be genuine i.e. they must not contain anything that may infringe the intellectual property rights of third parties. Team will be disqualified for using pirated items in the Competition and will be solely responsible for any loss or damage whatsoever arising from or related to the use of such pirated items
- The Secretariat will arrange a self-learning training about the intellectual property rights to all teams. Please complete the online quiz on or before 30 June 2023 (Fri). If uncompleted, the Secretariat reserves the right of score deduction
- The Secretariat may issue updates regarding the question contents, teams are advised to check email on a regular basis for Competition updates until the day before the Competition
- The *Installation Design (ID) Rules & Guidelines* is also available in Chinese. If there is any inconsistency or ambiguity between the English and Chinese versions, the **Chinese version shall prevail**

The CCC Secretariat reserves the right of final decision on all subject matters of the competition

Appendix 1:

List of Arduino Programmines

Programming categories:

Programming categories: **Digital I/O:**

pinMode()

digitalWrite()

digitalRead()

Analog I/O:

analogReference()

analogRead()

analogWrite()

analogReadResolution()

analogWriteResolutiion()

Advanced I/O:

tone()

noTone()

shiftOut()

shiftIn()

pulseIn()

Control Structure:

if

if...else

for

switch case

while

do...while

break

continue

return

goto

Comparison Operator:

==

!=

<

>

<=

>=

Math/Arithmetic Operator:

=

+

-

*

/

%

min()

max()

abs()

constrain()

map()

pow()

sqrt()

sin()

cos()

tan()

List micro:bit programmes (MakeCode Editor)

Programming categories:

Programming categories: "Basic"

Command

Show number

Show leds

Show icon

Show string

Clear screen

Forever

On start

Pause

Show arrow

"input" Command

On button A/B/A+B pressed

On shake (or any other gesture)

On pin pressed

Button A/B/A+B is pressed/ released

Acceleration

Light level

Compass bearing

Temperature

Is shake gesture

On loud sound (V2)

On logo pressed (V2)

Logo is pressed (V2)

Sound level (V2)

Rotation

Magnetic force

Running time

Calibration

Set accelerometer

Set loud sound threshold

"Music" Command

Play melody

Play tone

Rest

Set volume

Stop all sounds

Tempo

Melody Advanced

"Radio" Command

Radio set group

Radio send number, value and string set

transmit power

Frequency band

"Led" Command

Plot X & Y

Toggle X & Y

Unplot X & Y

Point X & Y

Plot bar graph

Brightness

Animation

"Loops" command

Repeat do

While do

For index from 0 – 4

For element "value" of "list"

Break

continue

“Logic” Command

If..then...else

=/ />/</≥/≤

And / or

boolean

“Math” Command

+/-/ /

0

Remainder

Min and max value

absolute

Various math command and function

Pick random

Constrain...between...and

Map

Pick random true or false

“Variable” Command

Make a variable

Set number to variable

Change variable

“Advanced” Commands

Functions

Arrays

Text

Game

Images

Pins

Serial

Control

Extensions

Appendix 2:

Arduino Sketch Sample

```
/*  
School: Primary School  
Division: Senior Primary  
Name of the Installation Design: A Post modern Journey to the West  
  
Scene 1  
Introduction  
Blowing off the Flaming Mountain: The master is trapped inside the flaming mountain, the  
monkey king performs a little magic to indicate the participant where the magical fan is  
located.To save the master, the participant will use the fan to fan the flame of the  
mountain.  
Overall Effects  
The LED lights on the flaming mountain will be switched on when the puppet is placed on  
the touch sensor, initiating the interactive game.  
A light sensor is placed inside the flaming mountain with a windmill at the top of the  
mountain.  
Team member will use fan to turns the windmill and change the light sensor value.  
Programme the servo to change the angle.  
*/  
  
#include // include "Servo" Library  
Servo servo_9; // set the name of servo motor  
  
void setup(){  
pinMode(A0,INPUT); // set pin A0 as input component  
servo_9.attach(9); // set pin 9 as servo motor  
  
A Post modern Journey to the West Photo of the Overall Installation Design :
```



micro:bit Sketch Sample

School: XX Primary School

Division: Senior Primary

Team: Team 1

Name: micro:bit Creativity Playground

Introduction

Micro:bit playground is opened now! Let's see any hidden treasure inside!

Scene 1

Ride on a micro:bit bus~

Overall Effects

Using micro:bit radio function to communicate with another micro:bit. Broadcast the signal in order to control the 360 degree servo motor on the remote car

Programming Sketch

Controller: see microbit-controller.hex

Receiver: see microbit-receiver.hex

Picture:



Scene 1 picture:

