2B3-PJ3BG1簡報

小組分工

40723217（組長）：整合場景建構、分配球員、連線操作設置

40923219　　：場景內程式編寫（７段式計分、計時）

40923225　　：資料蒐集整理、場地建模、簡報編寫

40923241　　：球員設計、建模

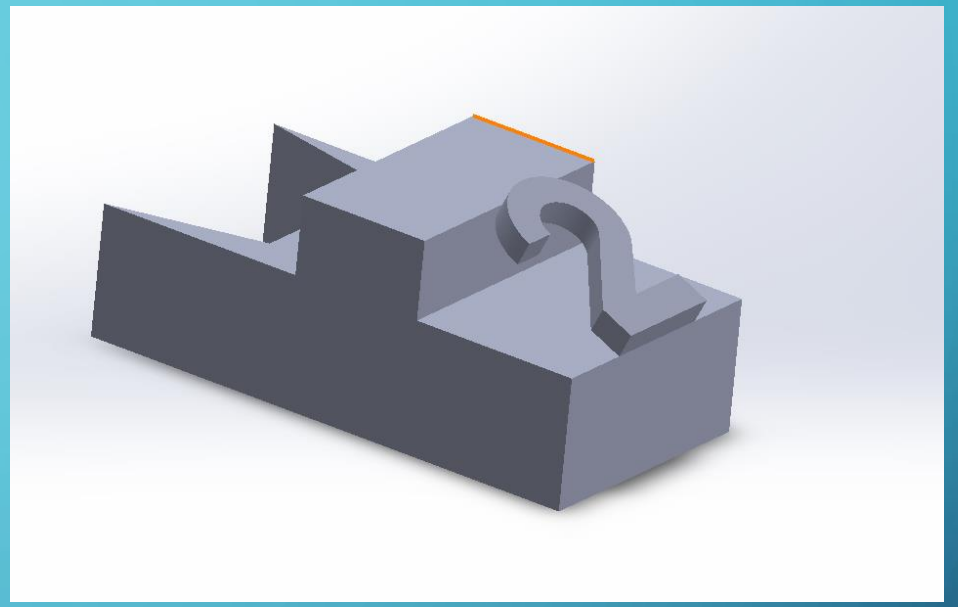
40923246　　：場景內程式編寫（轉盤式計分）

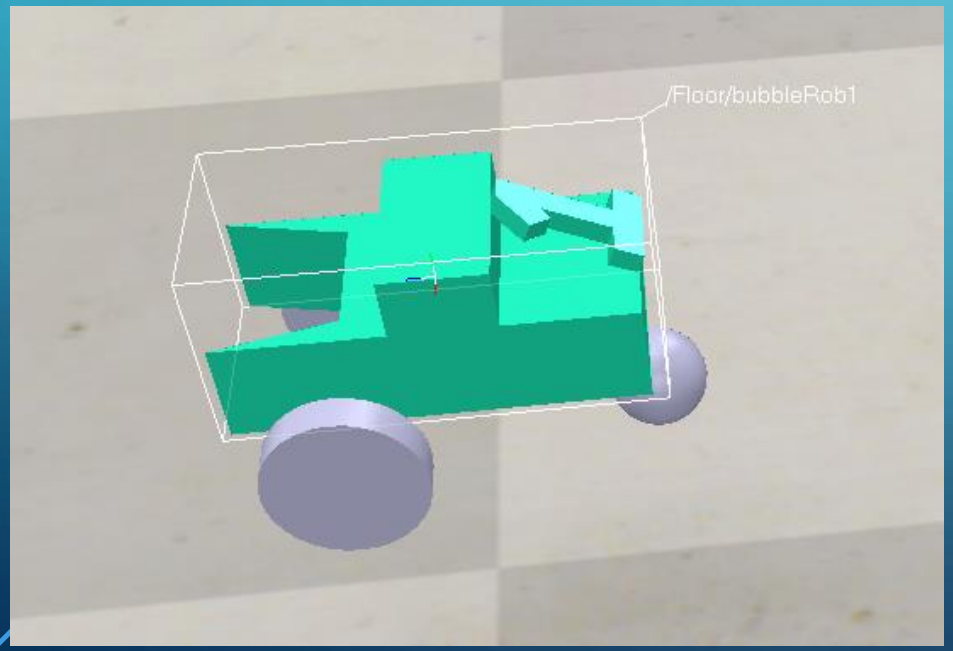
40971219　　：球員設計

40971220　　：SCITE程式編寫（球員）

球員設計製作

（淳宇、柏儒製作）
使用SOLIDWORKS繪製機器人外型

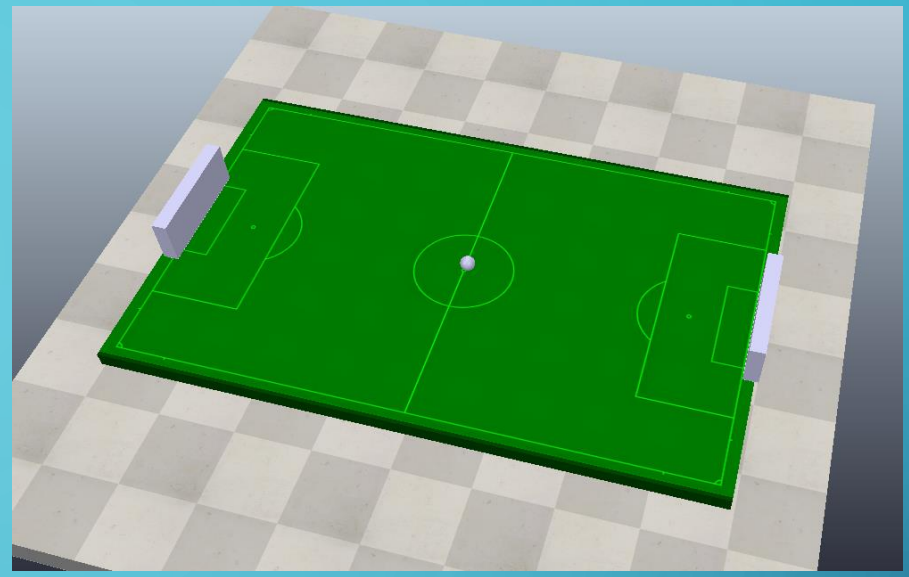




（立翔）
將機器人放入COPPELIASIM加入輪子

場地製作

（亦銘）
場地製作建模

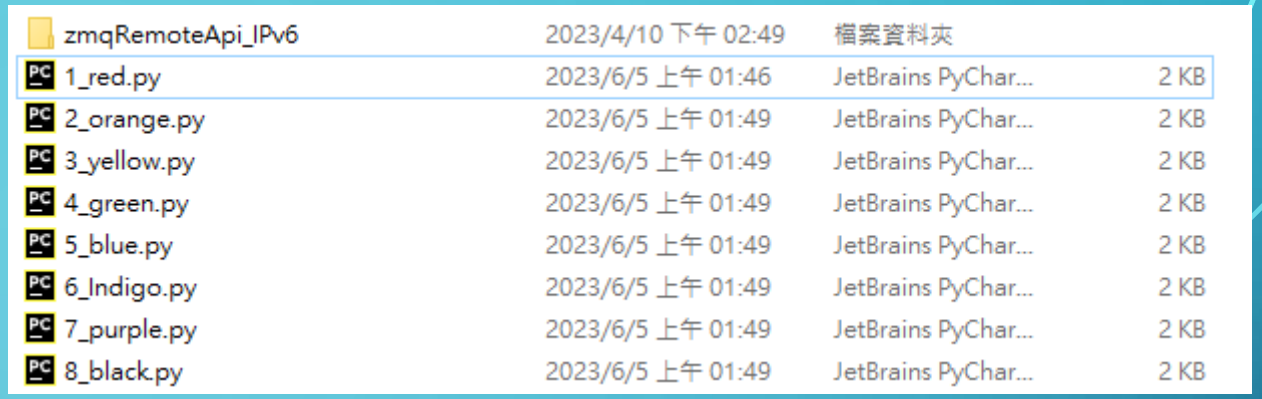


（柏成、仲佑）
（下圖為第一版）
加入記分板與計時器

（下圖為第二版）
加入轉盤記分板與機器人

程式碼

```python
from zmqRemoteApi_IPv6 import RemoteAPIClient
import time
import math
import keyboard

# 利用 zmqRemoteAPI 連線52的場景
client = RemoteAPIClient('2001:288:6004:17:2023:cdb:1:1', 23000)
print('Program started')
sim = client.getObject('sim')
# 非最後球員，不可啟動模擬
# sim.startSimulation()
# 加入按鍵狀態,起始值為 false
key_pressed = False
counter = 0

bubbleRob = sim.getObject('/bubbleRob1')
pos = [0.5,1,0.2]
ang = [0,0,0]

def setBubbleRobVelocity(leftWheelVelocity, rightWheelVelocity):
    leftMotor = sim.getObject('/leftMotor')
    rightMotor = sim.getObject('/rightMotor')
    sim.setJointTargetVelocity(leftMotor, leftWheelVelocity)
    sim.setJointTargetVelocity(rightMotor, rightWheelVelocity)

'''
# Example usage 1:
setBubbleRobVelocity(1.0, 1.0)
time.sleep(2)
setBubbleRobVelocity(0.0, 0.0)
'''

while True:
        if keyboard.is_pressed('w'):
                setBubbleRobVelocity(5.0, 5.0)
        elif keyboard.is_pressed('s'):
                setBubbleRobVelocity(-3.0, -3.0)
        elif keyboard.is_pressed('a'):
                setBubbleRobVelocity(-3.0, 3.0)
        elif keyboard.is_pressed('d'):
                setBubbleRobVelocity(3.0, -3.0)
        elif keyboard.is_pressed('q'):
                sim.setObjectPosition(bubbleRob, -1,pos)
                sim.setObjectOrientation(bubbleRob, -1,ang)
        else:
                setBubbleRobVelocity(0.0, 0.0)
```



zmqRemoteApi_IPv6	2023/4/10 下午 02:49	檔案資料夾	
1_red.py	2023/6/5 上午 01:46	JetBrains PyChar...	2 KB
2_orange.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
3_yellow.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
4_green.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
5_blue.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
6_Indigo.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
7_purple.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
8_black.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB

（立翔）
（上圖）
分配8台機器人使用之程式碼

（柏皓）
（左圖）
機器人使用之程式碼

程式碼詳解

（1～28行）：各部件命名、設置轉軸初始角度

（29～65行）：訂定初始位置、角度，設定好初始數值以及建立7段顯示用的陣列

```lua
function sysCall_init()
    bubbleRob1 = sim.getObject('./bubbleRob1')
    bubbleRob2 = sim.getObject('./bubbleRob2')
    bubbleRob3 = sim.getObject('./bubbleRob3')
    bubbleRob4 = sim.getObject('./bubbleRob4')
    bubbleRob5 = sim.getObject('./bubbleRob5')
    bubbleRob6 = sim.getObject('./bubbleRob6')
    bubbleRob7 = sim.getObject('./bubbleRob7')
    bubbleRob8 = sim.getObject('./bubbleRob8')
    sensor = sim.getObject('./sensor')
    sensor2 = sim.getObject('./sensor2')
    ball = sim.getObject('./ball')

    local math = require("math")
    joint1= sim.getObject('./joint1')
    joint2= sim.getObject('./joint2')
    joint3= sim.getObject('./joint3')
    joint4= sim.getObject('./joint4')
    sensor = sim.getObject('./sensor')
    r1 = 360
    r2 = 360
    r3 = 360
    r4 = 360
    sim.setJointTargetPosition(joint1, math.rad(r1+180))
    sim.setJointTargetPosition(joint2, math.rad(r2+180))
    sim.setJointTargetPosition(joint3, math.rad(r3+180))
    sim.setJointTargetPosition(joint4, math.rad(r4+180))
```

```lua
    pos1 = {0.5,1,0.2}
    pos2 = {1,0.5,0.2}
    pos3 = {1,-0.5,0.2}
    pos4 = {0.5,-1,0.2}
    pos5 = {-0.5,-1,0.2}
    pos6 = {-1,-0.5,0.2}
    pos7 = {-1,0.5,0.2}
    pos8 = {-0.5,1,0.2}
    posS = {0,0,0.2}
    ang1 = {1.57,0,0}
    ang2 = {0,0,3.14}
    ang3 = {0,-1.57,-1.57}
    ang4 = {0,0,0}



    count = 14400
    score1 = 0
    score2 = 0
    score3 = 0
    score4 = 0
    count = 6000
    score5 = 0
    score6 = 0
    score7 = 0
    score8 = 6
    s0={1,1,1,1,1,0,1}
    s1={0,0,1,1,0,0,0}
    s2={0,1,1,0,1,1,1}
    s3={0,0,1,1,1,1,1}
    s4={1,0,1,1,0,1,0}
    s5={1,0,0,1,1,1,1}
    s6={1,1,0,1,1,1,1}
    s7={0,0,1,1,1,0,0}
    s8={1,1,1,1,1,1,1}
    s9={1,0,1,1,1,1,1}
    s={s0,s1,s2,s3,s4,s5,s6,s7,s8,s9}
```

程式碼詳解

（66～130行）：記分板、計時器歸零，初始設定結束

```
66      for j = 0,6,1 do
67       a = sim.getObject('./_G['..j..']')
68          if (s[1][j+1]==1) then
69              sim.setShapeColor(a, nil, sim.colorcomponent_ambient_diffuse, {1, 0, 0})
70          else
71              sim.setShapeColor(a, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
72          end
73      end
74      for j = 0,6,1 do
75       b = sim.getObject('./G_['..j..']')
76          if (s[1][j+1]==1) then
77              sim.setShapeColor(b, nil, sim.colorcomponent_ambient_diffuse, {1, 0, 0})
78          else
79              sim.setShapeColor(b, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
80          end
81      end
82      for j = 0,6,1 do
83       d = sim.getObject('./_R['..j..']')
84          if (s[1][j+1]==1) then
85              sim.setShapeColor(d, nil, sim.colorcomponent_ambient_diffuse, {0, 1, 0})
86          else
87              sim.setShapeColor(d, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
88          end
89      end
90      for j = 0,6,1 do
91       c = sim.getObject('./R_['..j..']')
92          if (s[1][j+1]==1) then
93              sim.setShapeColor(c, nil, sim.colorcomponent_ambient_diffuse, {0, 1, 0})
94          else
95              sim.setShapeColor(c, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
96          end
97      end
98      for j = 0,6,1 do
99          local e = sim.getObject('./_G['..j..']')
100         if (s[1][j+1]==1) then
101             sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
102         else
103             sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
104         end
```

```
105     end
106     for j = 0,6,1 do
107         local f = sim.getObject('./C_['..j..']')
108         if (s[1][j+1]==1) then
109             sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
110         else
111             sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
112         end
113     end
114     for j = 0,6,1 do
115         local g = sim.getObject('./__C['..j..']')
116         if (s[1][j+1]==1) then
117             sim.setShapeColor(g, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
118         else
119             sim.setShapeColor(g, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
120         end
121     end
122     for j = 0,6,1 do
123         local h = sim.getObject('./_C_['..j..']')
124         if (s[1][j+1]==1) then
125             sim.setShapeColor(h, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
126         else
127             sim.setShapeColor(h, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
128         end
129     end
130 end
```

程式碼詳解

（131～194行）：用SENSOR檢查綠方得分，得分後先將球員和球的位置移回開始位置，將綠方分數+1並調整轉盤角度，用IF檢查是否進位再用FOR逐個調整7段顯示的顏色，途中加入了如果分數超過99就暫停模擬的機制

```
131 function sysCall_actuation()
132     result = sim.readProximitySensor(sensor)
133     if(r4>0 and result>0)then
134         sim.setObjectPosition(ball, -1, pos8)
135         sim.setObjectOrientation(ball, -1, ang4)
136         sim.setObjectPosition(bubbleRob1, -1, pos1)
137         sim.setObjectPosition(bubbleRob2, -1, pos2)
138         sim.setObjectPosition(bubbleRob3, -1, pos3)
139         sim.setObjectPosition(bubbleRob4, -1, pos4)
140         sim.setObjectPosition(bubbleRob5, -1, pos5)
141         sim.setObjectPosition(bubbleRob6, -1, pos6)
142         sim.setObjectPosition(bubbleRob7, -1, pos7)
143         sim.setObjectPosition(bubbleRob8, -1, pos8)
144         sim.setObjectOrientation(bubbleRob1, -1, ang3)
145         sim.setObjectOrientation(bubbleRob2, -1, ang1)
146         sim.setObjectOrientation(bubbleRob3, -1, ang1)
147         sim.setObjectOrientation(bubbleRob4, -1, ang4)
148         sim.setObjectOrientation(bubbleRob5, -1, ang2)
149         sim.setObjectOrientation(bubbleRob6, -1, ang2)
150         sim.setObjectOrientation(bubbleRob7, -1, ang2)
151         sim.setObjectOrientation(bubbleRob8, -1, ang2)
152         score1 = score1 + 1
153         r3=r3-36
154         sim.setJointTargetPosition(joint3, math.rad(r3+180))
155         if(r3==0) then
156             r3=360
157             r4=r4-36
158             sim.setJointTargetPosition(joint3, math.rad(r3+180))
159             sim.setJointTargetPosition(joint4, math.rad(r4+180))
160         end
161         if (score1 <= 9) then
162             i = score1 +1
163             for j = 0, 6, 1 do
164             a = sim.getObject('./G['..j..']')
165                 if (s[i][j+1] == 1) then
166                     sim.setShapeColor(a, nil, sim.colorcomponent_ambient_diffuse, {1, 0, 0})
167                 else
168                     sim.setShapeColor(a, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
169                 end
170             end
171         elseif (score1 > 9 and score2<=9) then
172         score1 = 0
173             for j = 0, 6, 1 do
174             a = sim.getObject('./G['..j..']')
175                 if (s[1][j+1] == 1) then
176                     sim.setShapeColor(a, nil, sim.colorcomponent_ambient_diffuse, {1, 0, 0})
177                 else
178                     sim.setShapeColor(a, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
179                 end
180             end
181             score2 = score2 + 1
182             i = score2 +1
183             for j = 0, 6, 1 do
184             b = sim.getObject('./G_['..j..']')
185                 if (s[i][j+1] == 1) then
186                     sim.setShapeColor(b, nil, sim.colorcomponent_ambient_diffuse, {1, 0, 0})
187                 else
188                     sim.setShapeColor(b, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
189                 end
190             end
191         else
192             sim.pauseSimulation()
193         end
194     end
195     result2 = sim.readProximitySensor(sensor2)
```

程式碼詳解

（195～257行）：紅方的得分，與綠方相同，同樣也加入了如果分數超過99就暫停模擬的機制

```
195     result2 = sim.readProximitySensor(sensor2)
196     if(r2>0 and result2>0)then
197         sim.setObjectPosition(ball, -1, posS)
198         sim.setObjectOrientation(ball, -1, ang4)
199         sim.setObjectPosition(bubbleRob1, -1, pos1)
200         sim.setObjectPosition(bubbleRob2, -1, pos2)
201         sim.setObjectPosition(bubbleRob3, -1, pos3)
202         sim.setObjectPosition(bubbleRob4, -1, pos4)
203         sim.setObjectPosition(bubbleRob5, -1, pos5)
204         sim.setObjectPosition(bubbleRob6, -1, pos6)
205         sim.setObjectPosition(bubbleRob7, -1, pos7)
206         sim.setObjectPosition(bubbleRob8, -1, pos8)
207         sim.setObjectOrientation(bubbleRob1, -1, ang3)
208         sim.setObjectOrientation(bubbleRob2, -1, ang1)
209         sim.setObjectOrientation(bubbleRob3, -1, ang1)
210         sim.setObjectOrientation(bubbleRob4, -1, ang4)
211         sim.setObjectOrientation(bubbleRob5, -1, ang2)
212         sim.setObjectOrientation(bubbleRob6, -1, ang2)
213         sim.setObjectOrientation(bubbleRob7, -1, ang2)
214         sim.setObjectOrientation(bubbleRob8, -1, ang2)
215         score3 = score3 + 1
216         r1=r1-36
217         sim.setJointTargetPosition(joint1, math.rad(r1+180))
218         if(r1==0) then
219             r1=360
220             r2=r2-36
221             sim.setJointTargetPosition(joint1, math.rad(r1+180))
222             sim.setJointTargetPosition(joint2, math.rad(r2+180))
223         end
224         if (score3 <= 9) then
225             i = score3 +1
226             for j = 0, 6, 1 do
227                 c = sim.getObject('./R1'..j..']')
228                 if (s[i][j+1] == 1) then
229                     sim.setShapeColor(c, nil, sim.colorcomponent_ambient_diffuse, {0, 1, 0})
230                 else
231                     sim.setShapeColor(c, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
232                 end
233             end
234         elseif (score3 > 9 and score4<=9) then
235             score3 = 0
```

```
235             score3 = 0
236             for j = 0, 6, 1 do
237                 c = sim.getObject('./R1'..j..']')
238                 if (s[1][j+1] == 1) then
239                     sim.setShapeColor(c, nil, sim.colorcomponent_ambient_diffuse, {0, 1, 0})
240                 else
241                     sim.setShapeColor(c, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
242                 end
243             end
244             score4 = score4 + 1
245             i = score4 +1
246             for j = 0, 6, 1 do
247                 d = sim.getObject('./R1'..j..']')
248                 if (s[i][j+1] == 1) then
249                     sim.setShapeColor(d, nil, sim.colorcomponent_ambient_diffuse, {0, 1, 0})
250                 else
251                     sim.setShapeColor(d, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
252                 end
253             end
254         else
255             sim.pauseSimulation()
256         end
257     end
```

程式碼詳解

```
258     if (count > 0) then
259     count = count - 1
260
261         if (score5 > 0) then
262             score5 = score5 - 1
263             for i = 0, 9, 1 do
264                 if (score5 == i) then
265                     for j = 0, 6, 1 do
266                         local e = sim.getObject('../c['..j..']')
267                         if (s[i+1][j+1] == 1) then
268                             sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
269                         else
270                             sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
271                         end
272                     end
273                 end
274             end
275         elseif (score6 > 0 and score5 <1) then
276             score5 = 9
277             score6 = score6 - 1
278             for i = 0 , 9, 1 do
279                 for j = 0, 6, 1 do
280                     local e = sim.getObject('../c['..j..']')
281                     if (s[i+1][j+1] == 1) then
282                         sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
283                     else
284                         sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
285                     end
286                 end
287                 if (score6 == i) then
288                     for j = 0, 6, 1 do
289                         local f = sim.getObject('../c_['..j..']')
290                         if (s[i+1][j+1] == 1) then
291                             sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
292                         else
293                             sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
294                         end
295                     end
296                 end
297             end
298         elseif (score7 > 0 and score6 < 1) then
299             score5 = 9
300             score6 = 9
301             score7 = score7 - 1
302             for i = 0 , 9, 1 do
303                 for j = 0, 6, 1 do
304                     local e = sim.getObject('../c['..j..']')
305                     local f = sim.getObject('../c_['..j..']')
```

```
298         elseif (score7 > 0 and score6 < 1) then
299             score5 = 9
300             score6 = 9
301             score7 = score7 - 1
302             for i = 0 , 9, 1 do
303                 for j = 0, 6, 1 do
304                     local e = sim.getObject('../c['..j..']')
305                     local f = sim.getObject('../c_['..j..']')
306                     if (s[i+1][j+1] == 1) then
307                         sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
308                         sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
309                     else
310                         sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
311                         sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
312                     end
313                 end
314                 if (score7 == i) then
315                     for j = 0, 6, 1 do
316                         local g = sim.getObject('../__c['..j..']')
317                         if (s[i+1][j+1] == 1) then
318                             sim.setShapeColor(g, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
319                         else
320                             sim.setShapeColor(g, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
321                         end
322                     end
323                 end
324             end
325         elseif (score8 > 0 and score7 <1) then
326             score5 = 9
327             score6 = 9
328             score7 = 9
329             score8 = score8 - 1
330             for i = 0 , 9, 1 do
331                 for j = 0, 6, 1 do
332                     local e = sim.getObject('../c['..j..']')
333                     local f = sim.getObject('../c_['..j..']')
334                     local g = sim.getObject('../__c['..j..']')
335                     if (s[i+1][j+1] == 1) then
336                         sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
337                         sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
338                         sim.setShapeColor(g, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
339                     else
340                         sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
341                         sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
342                         sim.setShapeColor(g, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
343                     end
344                 end
345                 if (score8 == i) then
346                     for j = 0, 6, 1 do
347                         local h = sim.getObject('../c_['..j..']')
```

```
348                     if (s[i+1][j+1] == 1) then
349                         sim.setShapeColor(h, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
350                     else
351                         sim.setShapeColor(h, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
352                     end
353                 end
354             end
355         end
356     else
357         sim.pauseSimulation()
358     end
359 else
360     sim.stopSimulation()
361 end
362 end
```

（258～297行）：倒計時，時間最前面就設定好了，一點一點倒數就好，一樣用IF檢查進位用FOR設定七段顯示最後數到小於零時暫停模擬，由於我們秒數取到小數後兩位，所以進位的程式比較繁雜

開會紀錄

- （暫缺後補...）