

2B3-PJ3BG1簡報

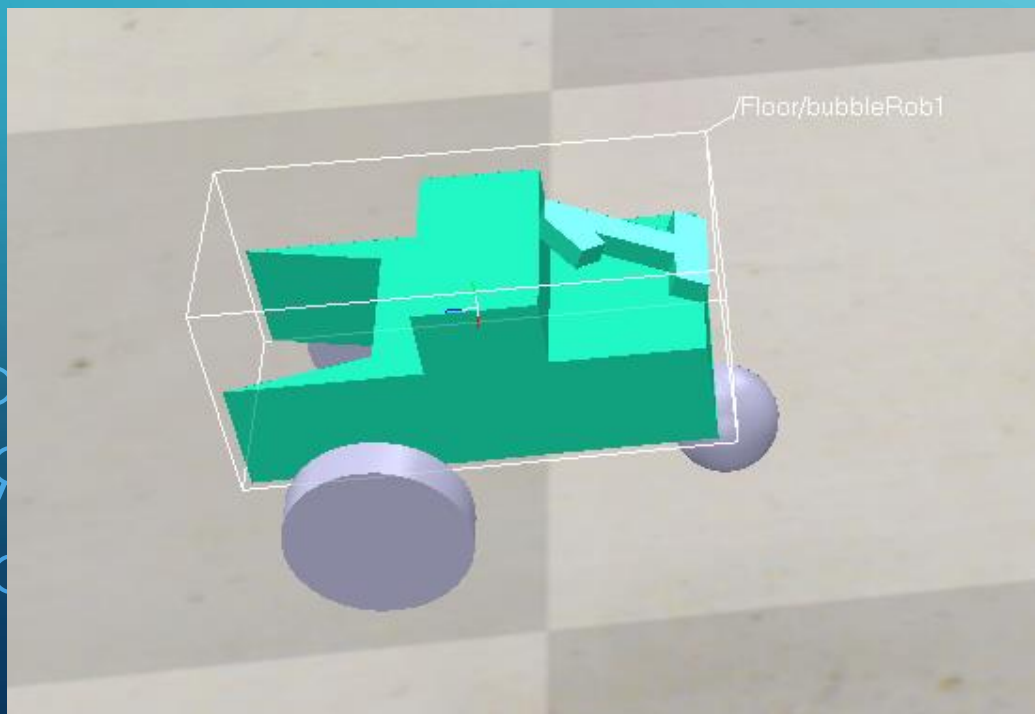
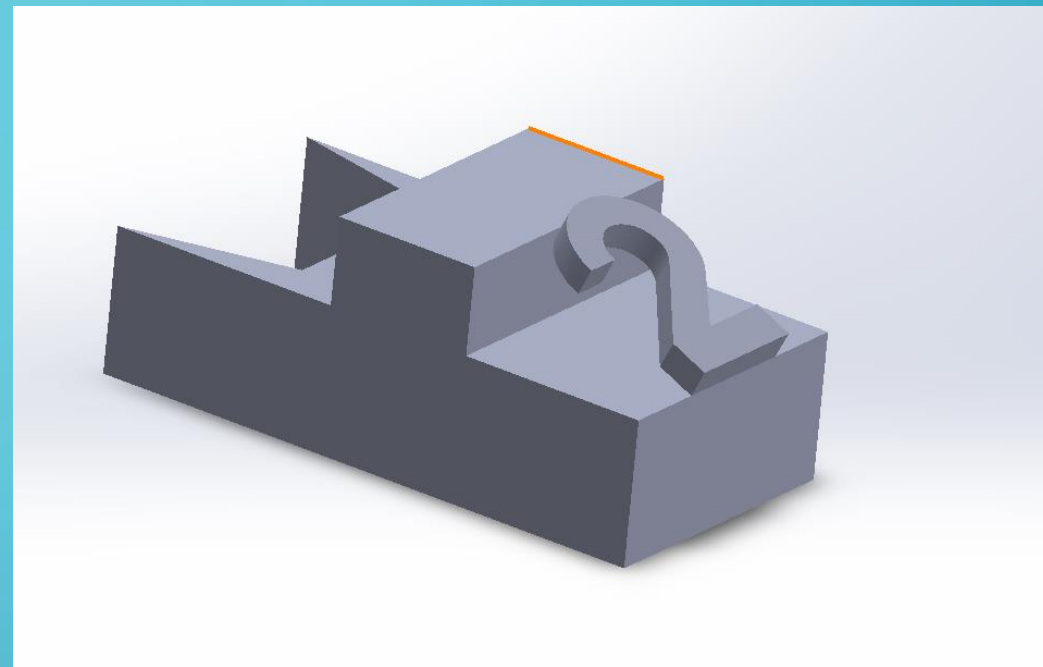


小組分工

- 40723217 林立翔（組長）**：整合場景建構、分配球員、連線操作設置
- 40923219 陳柏成**：場景內程式編寫（7段式計分、計時）
- 40923225 黃亦銘**：資料蒐集整理、場地建模、簡報編寫
- 40923241 蔡淳宇**：球員設計、建模
- 40923246 蕭仲佑**：場景內程式編寫（轉盤式計分）
- 40971219 黃柏儒**：球員設計
- 40971220 傅柏皓**：**SCITE**程式編寫（球員）

球員設計製作

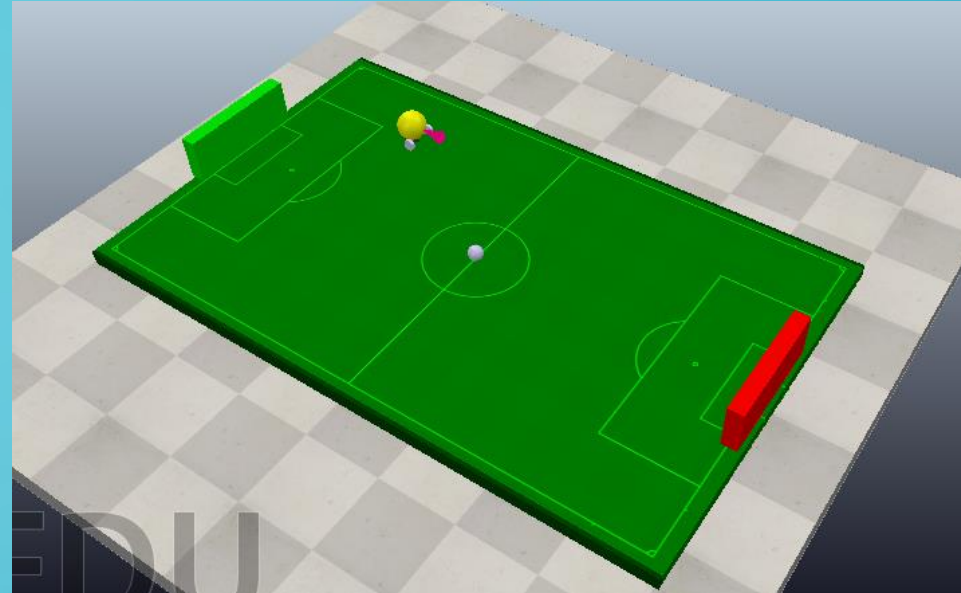
(淳宇、柏儒製作)
使用**SOLIDWORKS**繪製機器人外型



(立翔)
將機器人放入**COPPELLASIM**加入輪子

場地製作

(亦銘)
初始場地製作
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

```
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	
PC 1_red.py	2023/6/5 上午 01:46	JetBrains PyChar...	2 KB
PC 2_orange.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
PC 3_yellow.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
PC 4_green.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
PC 5_blue.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
PC 6_Indigo.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
PC 7_purple.py	2023/6/5 上午 01:49	JetBrains PyChar...	2 KB
PC 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

```
1 function sysCall_init()  
2     bubbleRob1 = sim.getObject('./bubbleRob1')  
3     bubbleRob2 = sim.getObject('./bubbleRob2')  
4     bubbleRob3 = sim.getObject('./bubbleRob3')  
5     bubbleRob4 = sim.getObject('./bubbleRob4')  
6     bubbleRob5 = sim.getObject('./bubbleRob5')  
7     bubbleRob6 = sim.getObject('./bubbleRob6')  
8     bubbleRob7 = sim.getObject('./bubbleRob7')  
9     bubbleRob8 = sim.getObject('./bubbleRob8')  
10    sensor = sim.getObject('./sensor')  
11    sensor2 = sim.getObject('./sensor2')  
12    ball = sim.getObject('./ball')  
13  
14    local math = require("math")  
15    joint1= sim.getObject('./joint1')  
16    joint2= sim.getObject('./joint2')  
17    joint3= sim.getObject('./joint3')  
18    joint4= sim.getObject('./joint4')  
19    sensor = sim.getObject('./sensor')  
20    r1 = 360  
21    r2 = 360  
22    r3 = 360  
23    r4 = 360  
24    sim.setJointTargetPosition(joint1, math.rad(r1+180))  
25    sim.setJointTargetPosition(joint2, math.rad(r2+180))  
26    sim.setJointTargetPosition(joint3, math.rad(r3+180))  
27    sim.setJointTargetPosition(joint4, math.rad(r4+180))  
28  
29    pos1 = {0.5,1,0.2}  
30    pos2 = {1,0.5,0.2}  
31    pos3 = {1,-0.5,0.2}  
32    pos4 = {0.5,-1,0.2}  
33    pos5 = {-0.5,-1,0.2}  
34    pos6 = {-1,-0.5,0.2}  
35    pos7 = {-1,0.5,0.2}  
36    pos8 = {-0.5,1,0.2}  
37    posS = {0,0,0.2}  
38    ang1 = {1.57,0,0}  
39    ang2 = {0,0,3.14}  
40    ang3 = {0,-1.57,-1.57}  
41    ang4 = {0,0,0}
```

(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

```
42  
43  
44  
45    count = 14400  
46    score1 = 0  
47    score2 = 0  
48    score3 = 0  
49    score4 = 0  
50    count = 6000  
51    score5 = 0  
52    score6 = 0  
53    score7 = 0  
54    score8 = 6  
55    s0={1,1,1,1,1,1,0,1}  
56    s1={0,0,1,1,0,0,0}  
57    s2={0,1,1,0,1,1,1}  
58    s3={0,0,1,1,1,1,1}  
59    s4={1,0,1,1,0,1,0}  
60    s5={1,0,0,1,1,1,1}  
61    s6={1,1,0,1,1,1,1}  
62    s7={0,0,1,1,1,0,0}  
63    s8={1,1,1,1,1,1,1}  
64    s9={1,0,1,1,1,1,1}  
65    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('/_C['..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, posS)
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('/_s[1..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('/_s[1..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('/_s[1..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('/_R[\"..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
236         score3 = 0
237         for j = 0, 6, 1 do
238             c = sim.getObject('/_R[\"..j..\"]')
239             if (s[i][j+1] == 1) then
240                 sim.setShapeColor(c, nil, sim.colorcomponent_ambient_diffuse, {0, 1, 0})
241             else
242                 sim.setShapeColor(c, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
243             end
244         end
245         score4 = score4 + 1
246         i = score4 + 1
247         for j = 0, 6, 1 do
248             d = sim.getObject('/_R[\"..j..\"]')
249             if (s[i][j+1] == 1) then
250                 sim.setShapeColor(d, nil, sim.colorcomponent_ambient_diffuse, {0, 1, 0})
251             else
252                 sim.setShapeColor(d, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
253             end
254         end
255     else
256         sim.pauseSimulation()
257     end
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('/_G["..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('/_G["..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         end
288     elseif (score7 > 0 and score6 < 1) then
289         score5 = 9
290         score6 = 9
291         score7 = score7 - 1
292         for i = 0, 9, 1 do
293             for j = 0, 6, 1 do
294                 local e = sim.getObject('/_G["..j.."]')
295                 local f = sim.getObject('/_G["..j.."]')
```

```
296 elseif (score7 > 0 and score6 < 1) then
297     score5 = 9
298     score6 = 9
299     score7 = score7 - 1
300     for i = 0, 9, 1 do
301         for j = 0, 6, 1 do
302             local e = sim.getObject('/_G["..j.."]')
303             local f = sim.getObject('/_G["..j.."]')
304             if (s[i+1][j+1] == 1) then
305                 sim.setShapeColor(e, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
306             else
307                 sim.setShapeColor(f, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
308             end
309         end
310     end
311     if (score7 == i) then
312         for j = 0, 6, 1 do
313             local g = sim.getObject('/_G["..j.."]')
314             if (s[i+1][j+1] == 1) then
315                 sim.setShapeColor(g, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
316             else
317                 sim.setShapeColor(g, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
318             end
319         end
320     end
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('/_G["..j.."]')
333             local f = sim.getObject('/_G["..j.."]')
334             local g = sim.getObject('/_G["..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     end
346     if (score8 == i) then
347         for j = 0, 6, 1 do
348             local h = sim.getObject('/_G["..j.."]')
349             if (s[i+1][j+1] == 1) then
350                 sim.setShapeColor(h, nil, sim.colorcomponent_ambient_diffuse, {0, 0, 0})
351             else
352                 sim.setShapeColor(h, nil, sim.colorcomponent_ambient_diffuse, {1, 1, 1})
353             end
354         end
355     end
356 end
357 else
358     sim.pauseSimulation()
359 end
360 else
361     sim.stopSimulation()
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...）