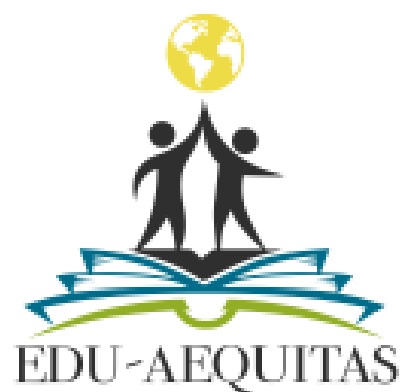




EA-清華STEAM學校 x 拓可思

2022 STEAM 運算思維挑戰賽



國立交通大學
National Chiao Tung University

產學運籌中心
Center of Academia and
Industry Collaboration



MAKERPRO

ABOUT

TARKUS
i n n o v a t i o n

● 比賽進行流程

時間	項目
09:00 – 10:00	場地設置
10:00 – 10:30	開幕典禮 簡介及教學示範
10:30 – 12:00	教學及分組測試
12:00 – 13:30	午膳*
13:30 – 15:00	分組比賽回合
15:00 – 15:30	頒獎及閉幕典禮
15:30 – 16:30	EA-清華STEAM學校證書說明會
16:30 – 17:00	賦歸



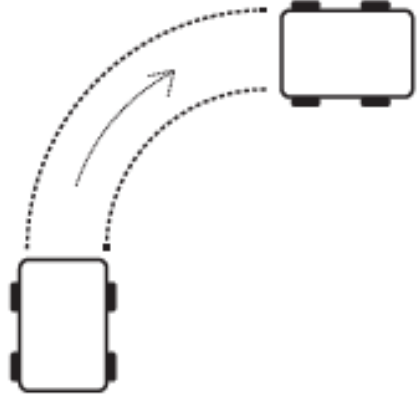
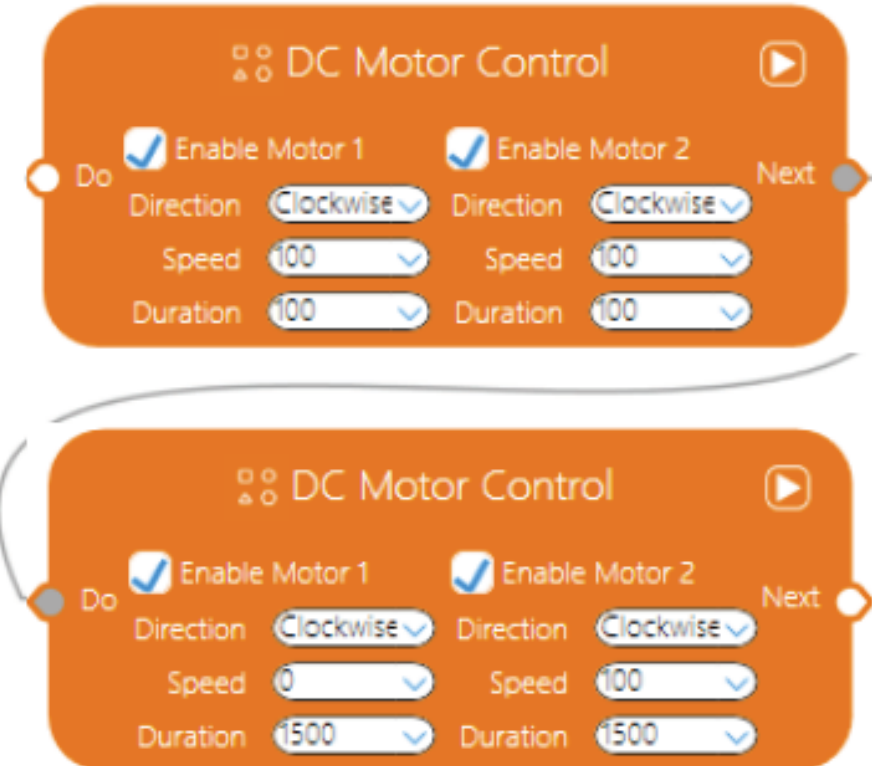
A. 教學及分組測試

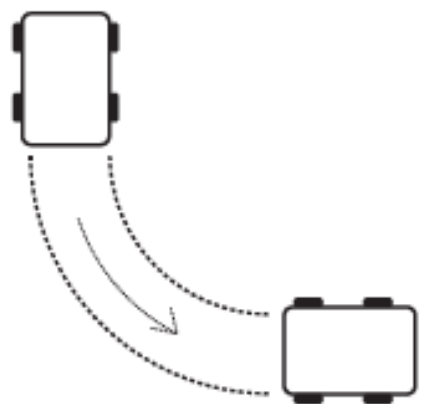
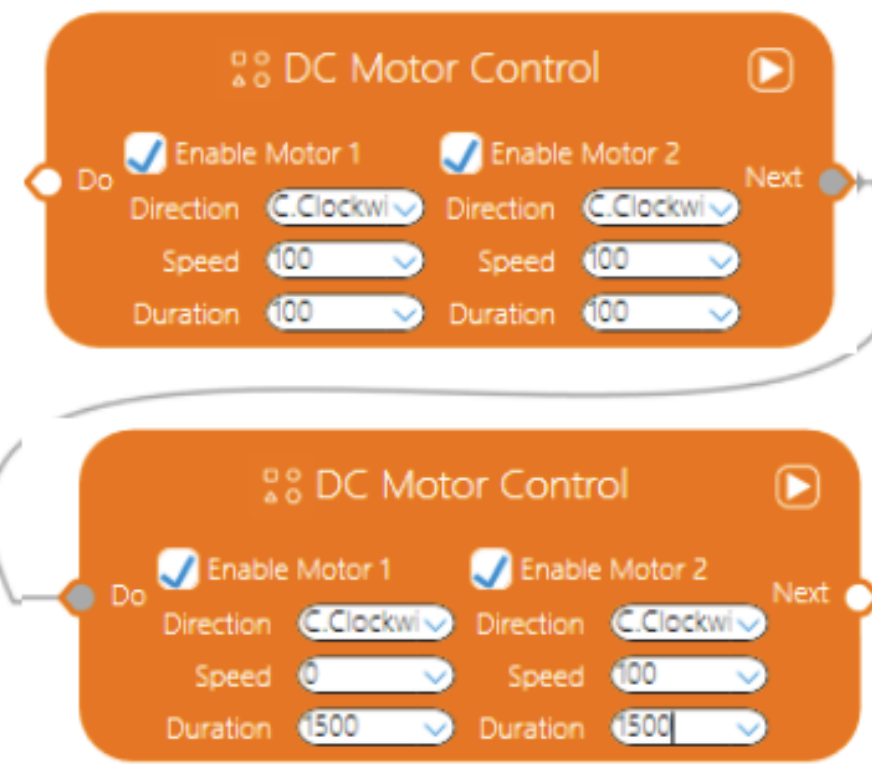
A. 教學及分組測試

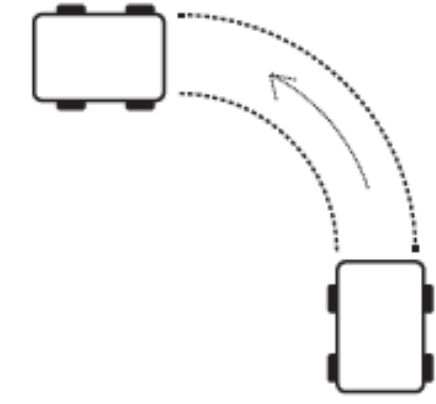
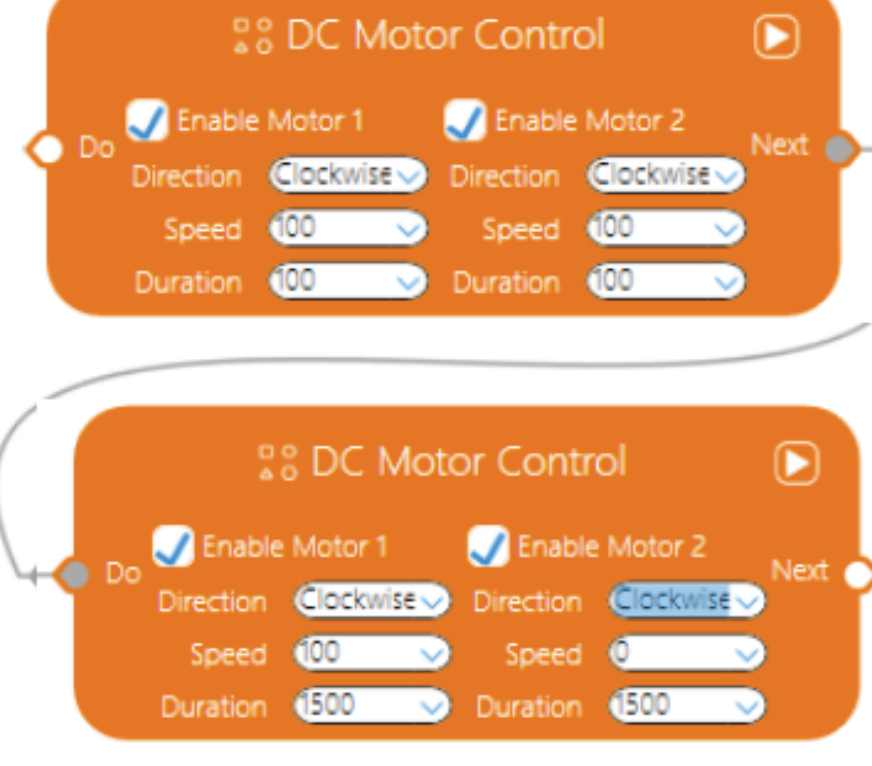
B. 自走車設備：

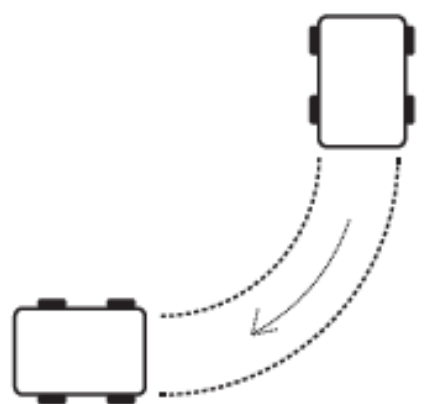
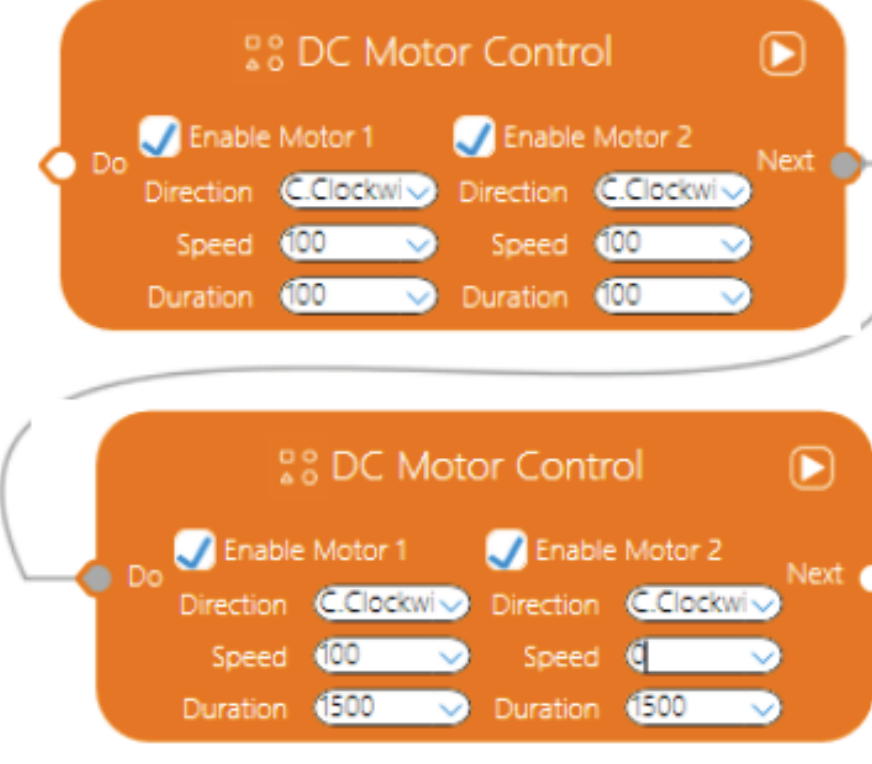
A. BeeCar 基礎套件 (馬達模組調校)

● Option1: Differential speed turning

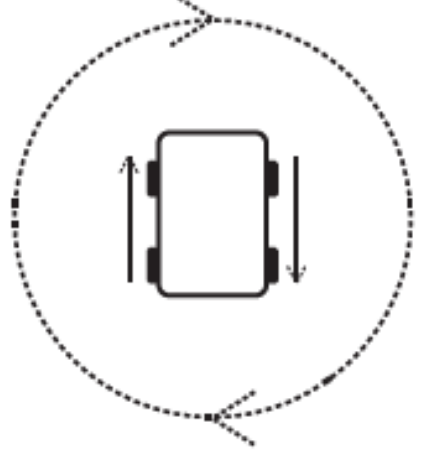
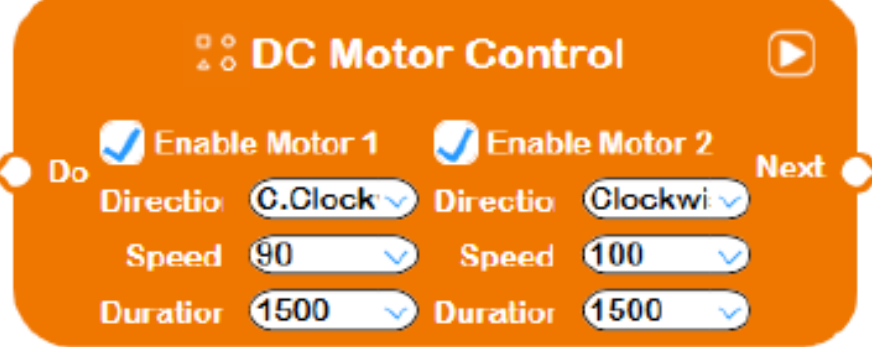
Right forward (Turning in differential speed)	Settings in software
At the first step, the left and right wheels will start at the same time for a while, such as a period of time for 100 milliseconds is set (0.1 second). At the second step, the left wheel will travel forward a longer distance than right wheel.  Motor one (forward rotation, speed 100, duration 1500 ms) Motor two (forward rotation, speed 0, duration 1500 ms)	【 Set the motors forward at 0.1 second, then set motor 1 with speed at 0 and motor 2 with full speed at 100 】 

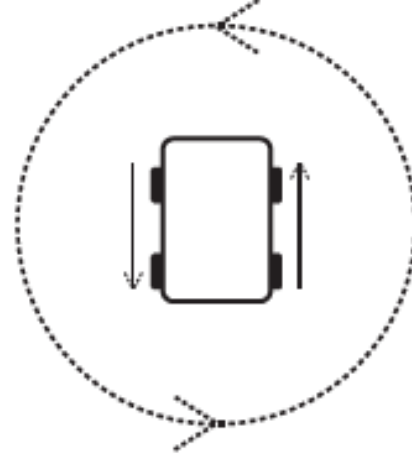
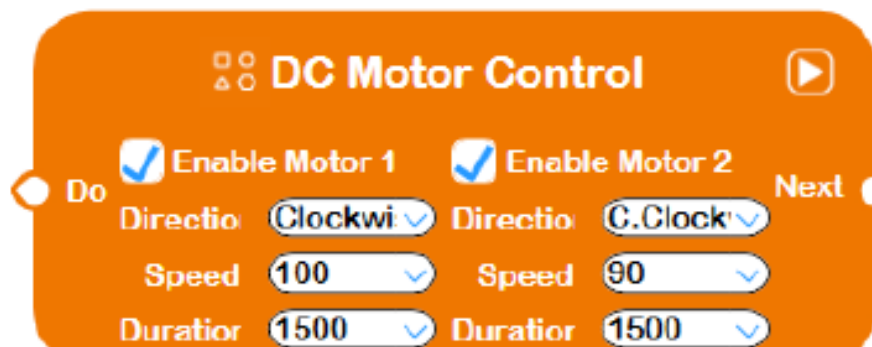
Right backward (Turning in differential speed)	Settings in software
At the first step, the left and right wheels will start at the same time for a while, such as a period of time for 100 milliseconds is set (0.1 second). At the second step, the left wheel will travel backward a longer distance than right wheel.  Motor one (forward rotation, speed 100, duration 1500 ms) Motor two (forward rotation, speed 0, duration 1500 ms)	【 Set the motors backward at 0.1 second, then set motor 1 with speed at 0 and motor 2 with full speed at 100 】 

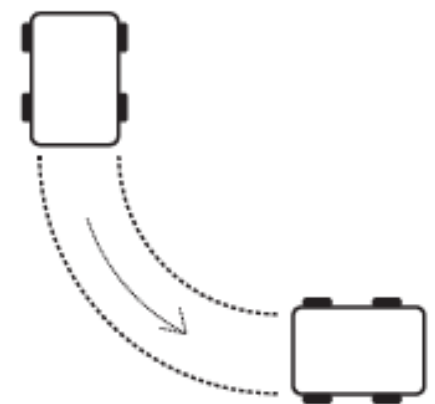
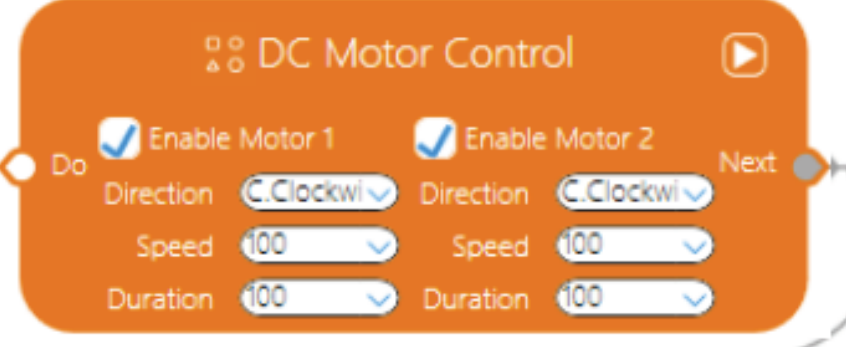
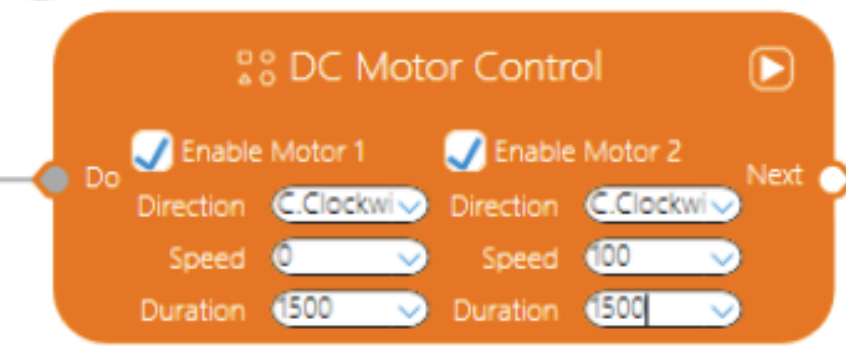
	Settings in software
At the first step, the left and right wheels will start at the same time for a while, such as a period of time for 100 milliseconds is set (0.1 second). At the second step, the right wheel will travel forward a longer distance than left wheel.  Motor one (forward rotation, speed 0, duration 1500 ms) Motor two (forward rotation, speed 100, duration 1500 ms)	【 Set the motors forward at 0.1 second, then set motor 1 with full speed at 100 and motor 2 with speed at 0 】 

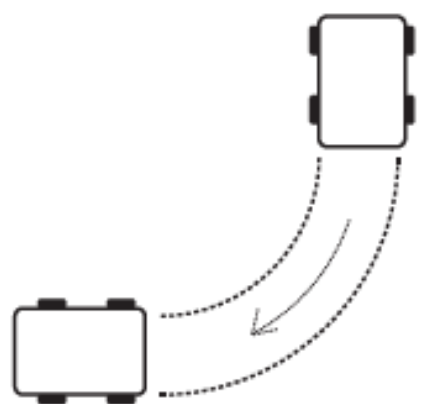
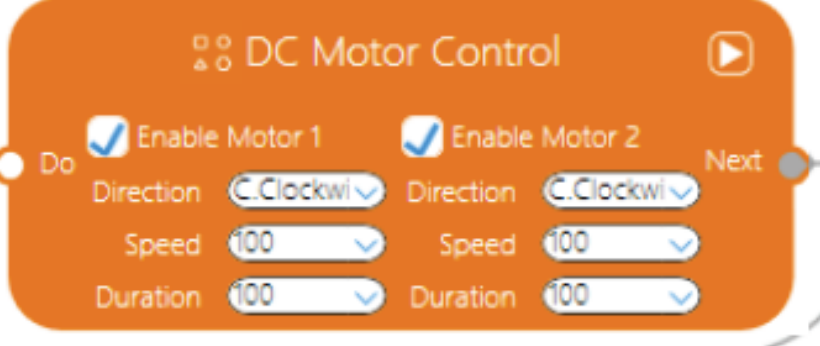
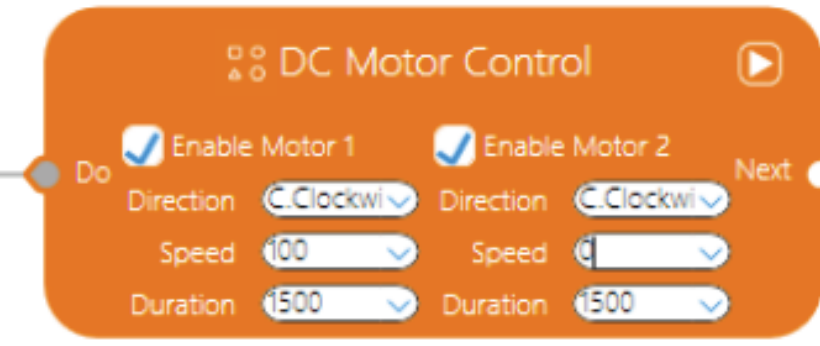
Left backward (Turning in differential speed)	Settings in software
At the first step, the left and right wheels will start at the same time for a while, such as a period of time for 100 milliseconds is set (0.1 second). At the second step, the right wheel will travel backward a longer distance than left wheel.  Motor one (forward rotation, speed 0, duration 1500 ms) Motor two (forward rotation, speed 100, duration 1500 ms)	【 Set the motors backward at 0.1 second, then set motor 1 with full speed at 100 and motor 2 with speed at 0 】 

● Option2: Spin turning

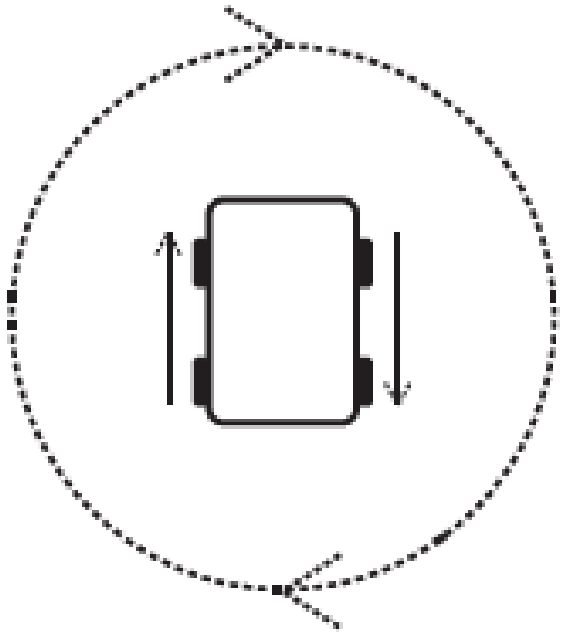
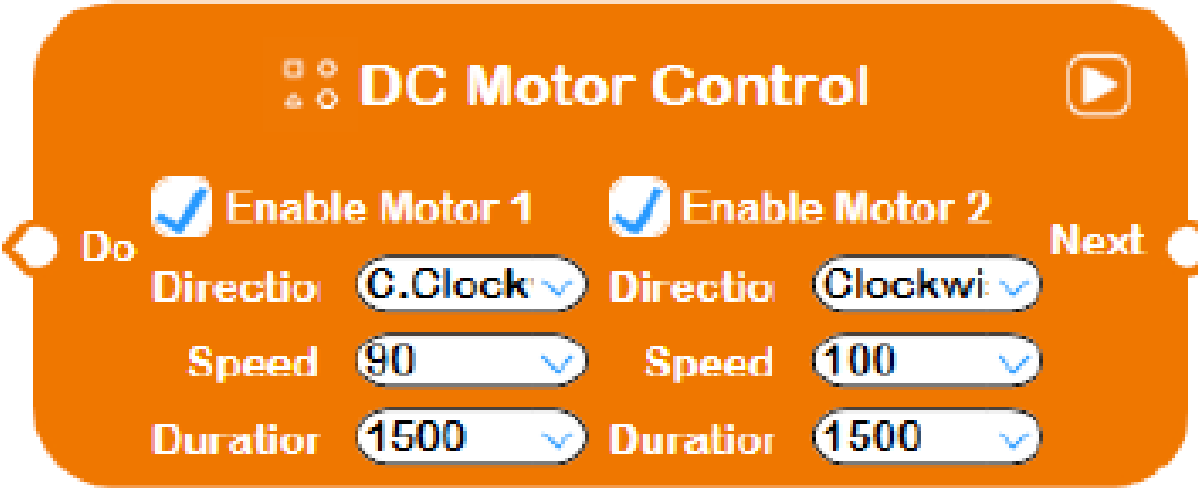
Right hand rotation (Spin clockwise)	Settings in software
Motor one moves in reverse rotation, while motor two rotates forward with speed and duration as the same as turning right. (distance left wheel > right wheel) 	 Motor 1 (reverse, speed 90, duration 1500 ms) motor 2 (forward, speed 100, duration 1500 ms)

Left hand rotation (Spin counter-clockwise)	Settings in software
Motor one moves in forward rotation, while motor two rotates reverse with speed and duration as the same as turning right. (distance right wheel > left wheel) 	 Motor 1 (forward rotation, speed 100, duration 1500 ms) motor 2 (reverse, speed 90, duration 1500 ms)

Right backward (Turning in differential speed)	Settings in software
At the first step, the left and right wheels will start at the same time for a while, such as a period of time for 100 milliseconds is set (0.1 second). At the second step, the left wheel will travel backward a longer distance than right wheel.  Motor one (forward rotation, speed 100, duration 1500 ms) Motor two (forward rotation, speed 0, duration 1500 ms)	【 Set the motors backward at 0.1 second, then set motor 1 with speed at 0 and motor 2 with full speed at 100 】  

Left backward (Turning in differential speed)	Settings in software
At the first step, the left and right wheels will start at the same time for a while, such as a period of time for 100 milliseconds is set (0.1 second). At the second step, the right wheel will travel backward a longer distance than left wheel.  Motor one (forward rotation, speed 0, duration 1500 ms) Motor two (forward rotation, speed 100, duration 1500 ms)	【 Set the motors backward at 0.1 second, then set motor 1 with full speed at 100 and motor 2 with speed at 0 】  

● 影響旋轉的因素

Right hand rotation (Spin clockwise)	Settings in software
Motor one moves in reverse rotation, while motor two rotates forward with speed and duration as the same as turning right. (distance left wheel > right wheel) 	 Motor 1 (reverse, speed 90, duration 1500 ms) motor 2 (forward, speed 100, duration 1500 ms)

如果想實現90度的左轉或右轉，可以調整下面的參數

- 左右馬達的轉速(Speed)
- 所需要的時間
- 於時限內利用最短時間完成



A. 分組測試

A. 先將馬達模組裝上輪胎

B. 測試方式

1. 先確認前進時車子是直線前進
2. 使用旋轉的方式來轉彎, 調整適合手上這台車子的參數

潛入基地任務

A. ※於比賽前可以設計自走車外觀，以不影響比賽進行為主

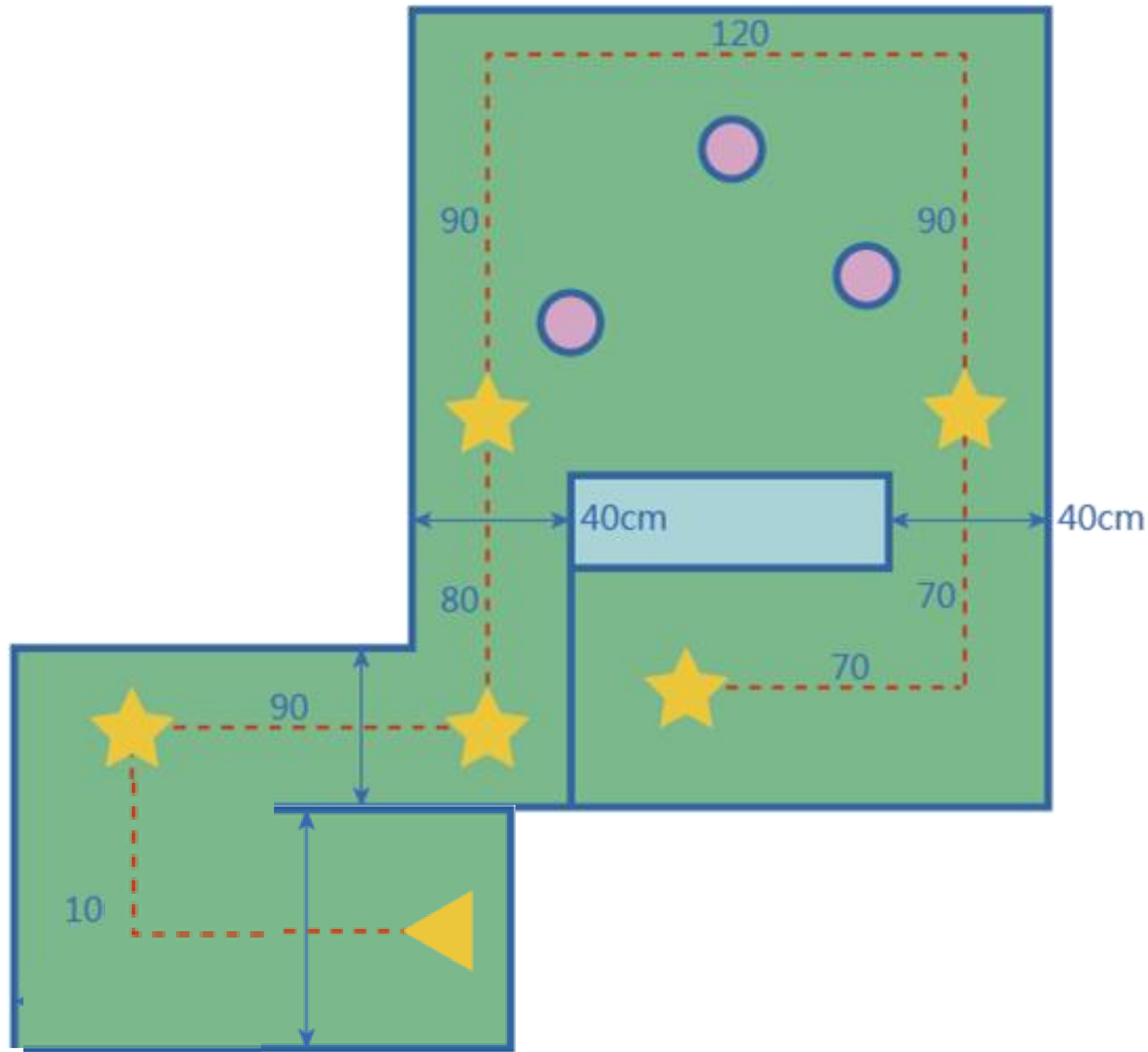
B. 潛入路徑(場地)：

一般路徑為 60cm 寬，窄道路徑將由 60cm 縮短至 40cm 寬

C. 自走車設備：

A. BeeCar 基礎套件 (主板、距離感測器、馬達)

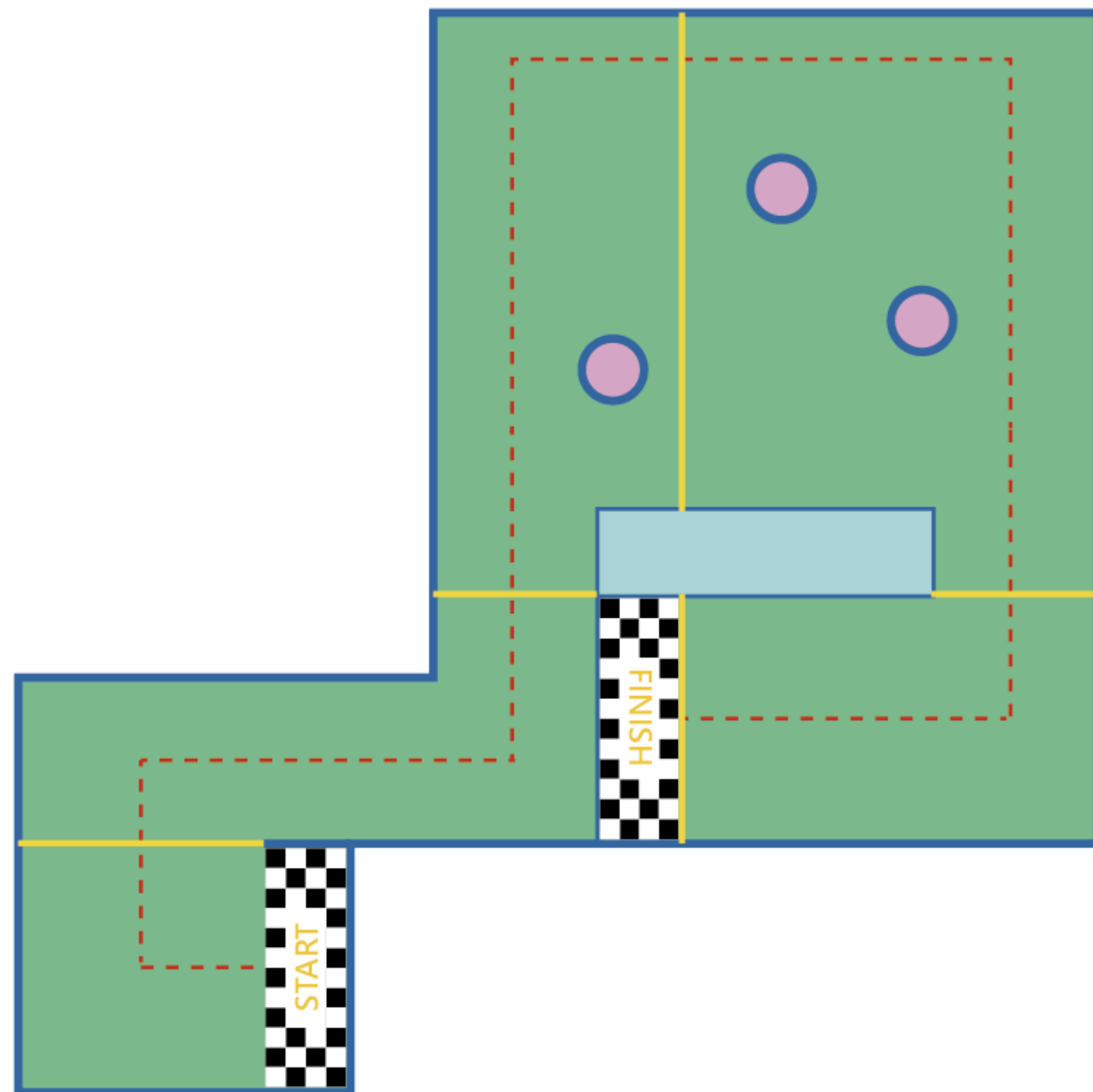
- Brainstorming



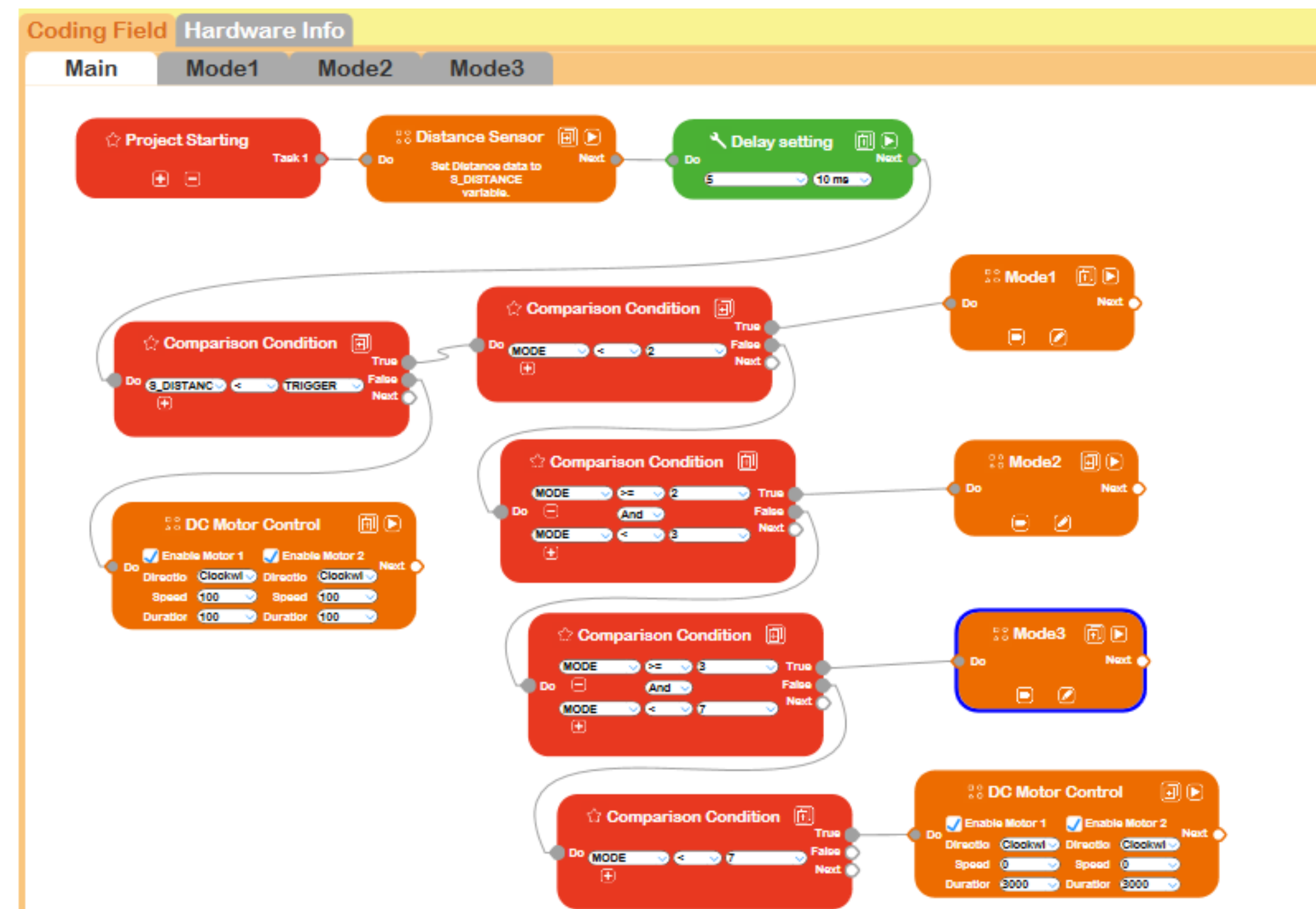
● Brainstorming

先比得分最多, 同分比完成時間最短

- 以四周圍牆包圍出來的迷宮
- 踩點得分制，踩一點可獲 20 分，完成共得 100 分
- 如果分數相同，比較於時限內利用最短時間完賽隊伍



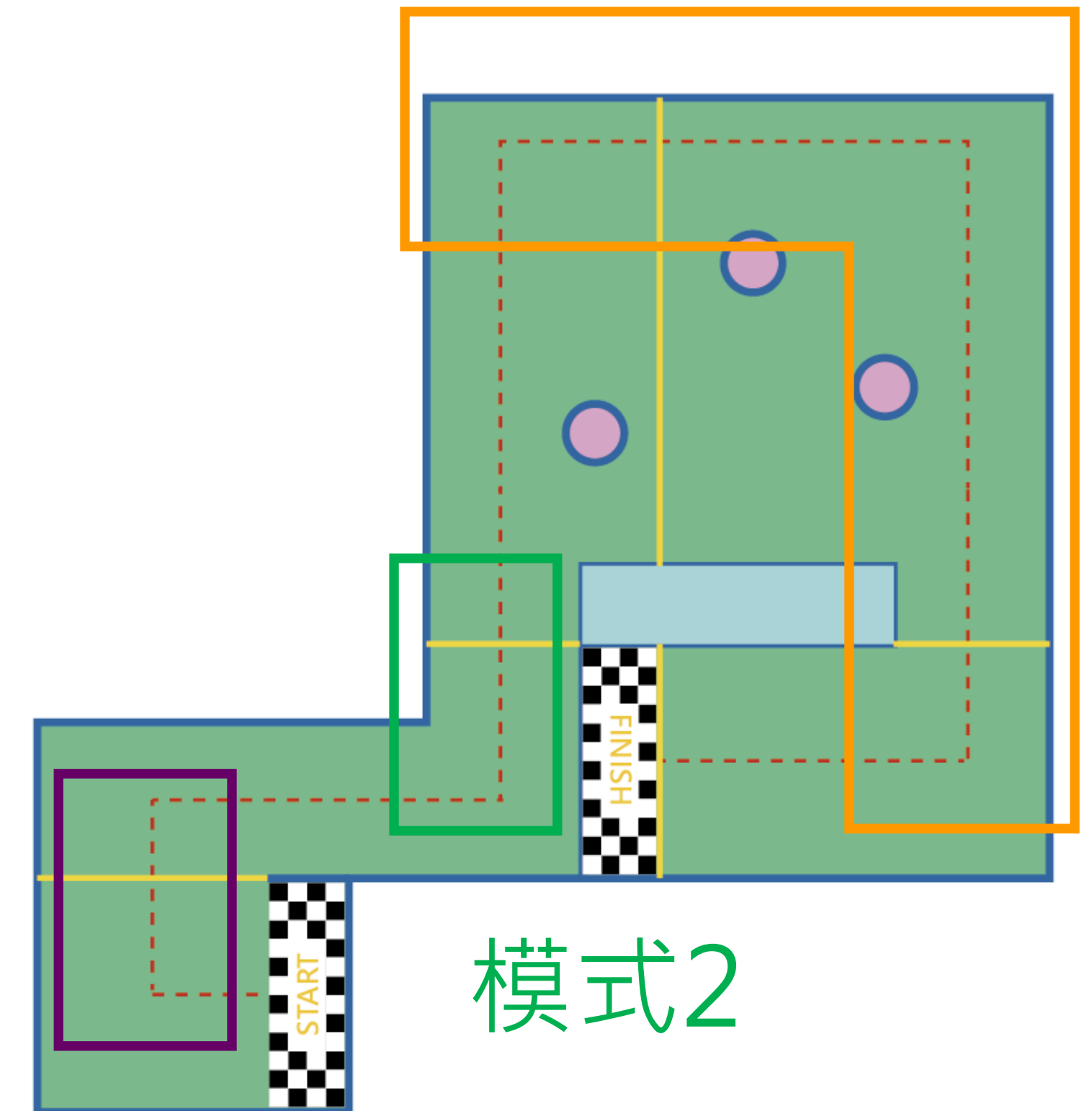
● 回合A



模式1

模式2

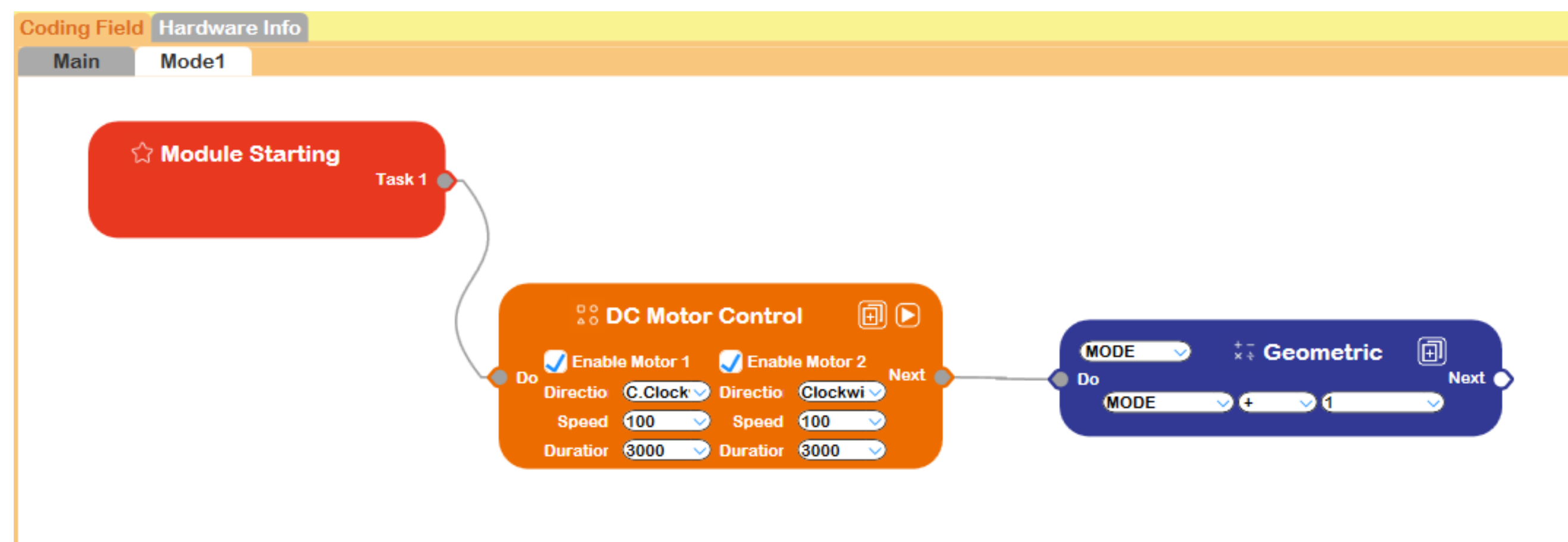
模式3



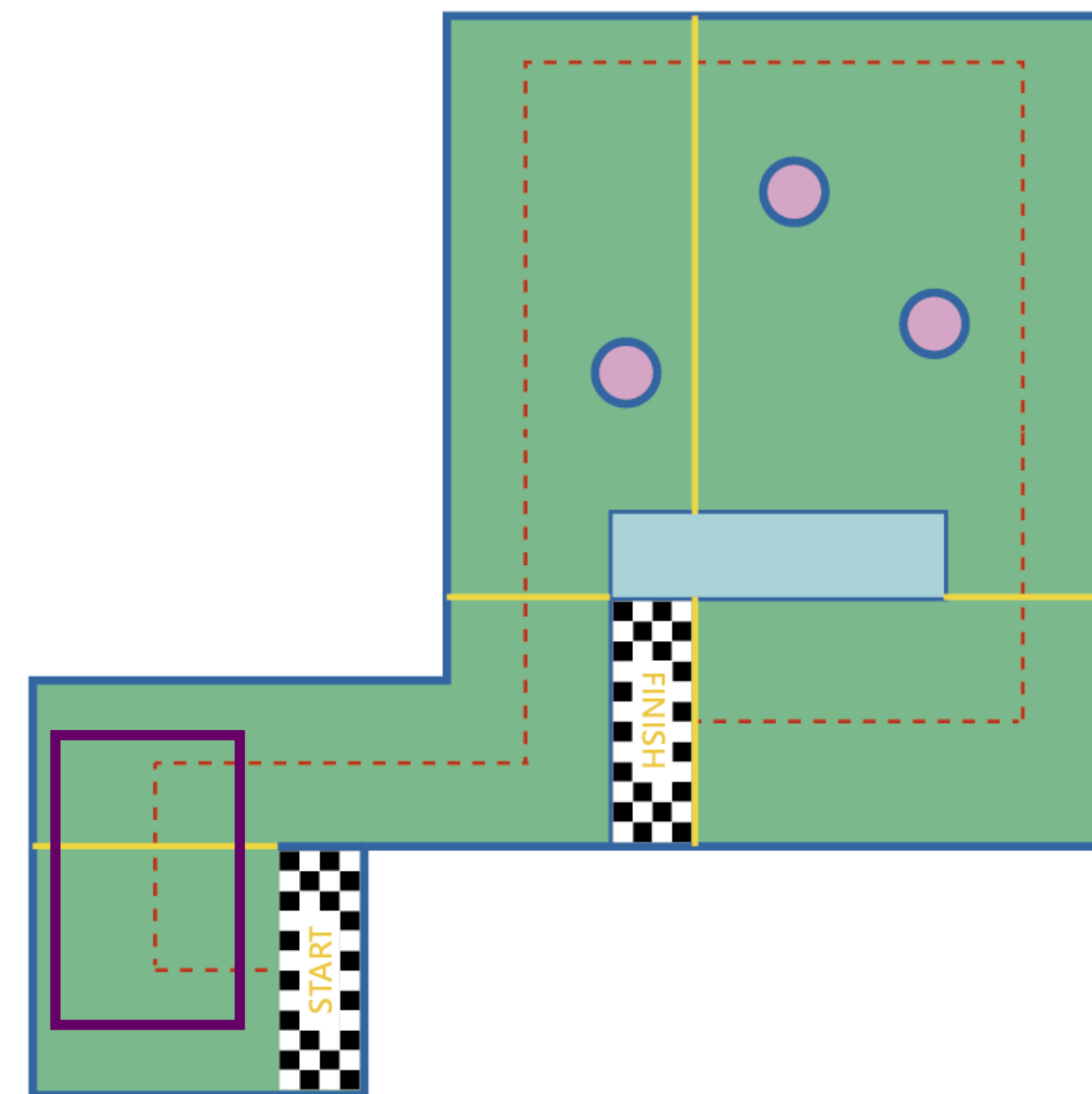
場地可分為三種模式

- 模式1(MODE=0): 距離感測器遇到障礙物向右旋轉x2
- 模式2(MODE=2): 距離感測器遇到障礙物向左旋轉
- 模式3(MODE=3): 距離感測器遇到障礙物向右旋轉x3

● 模式1



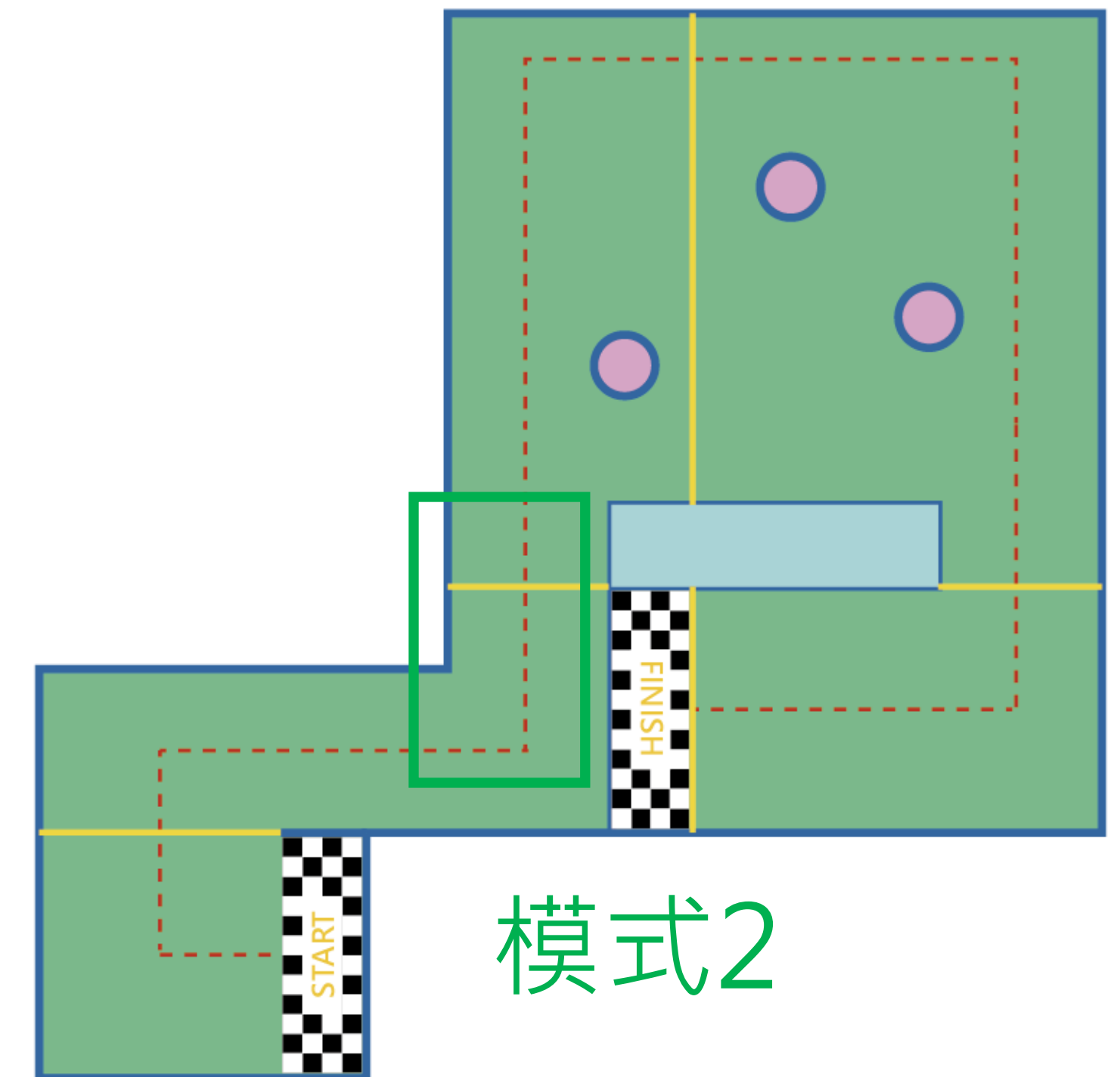
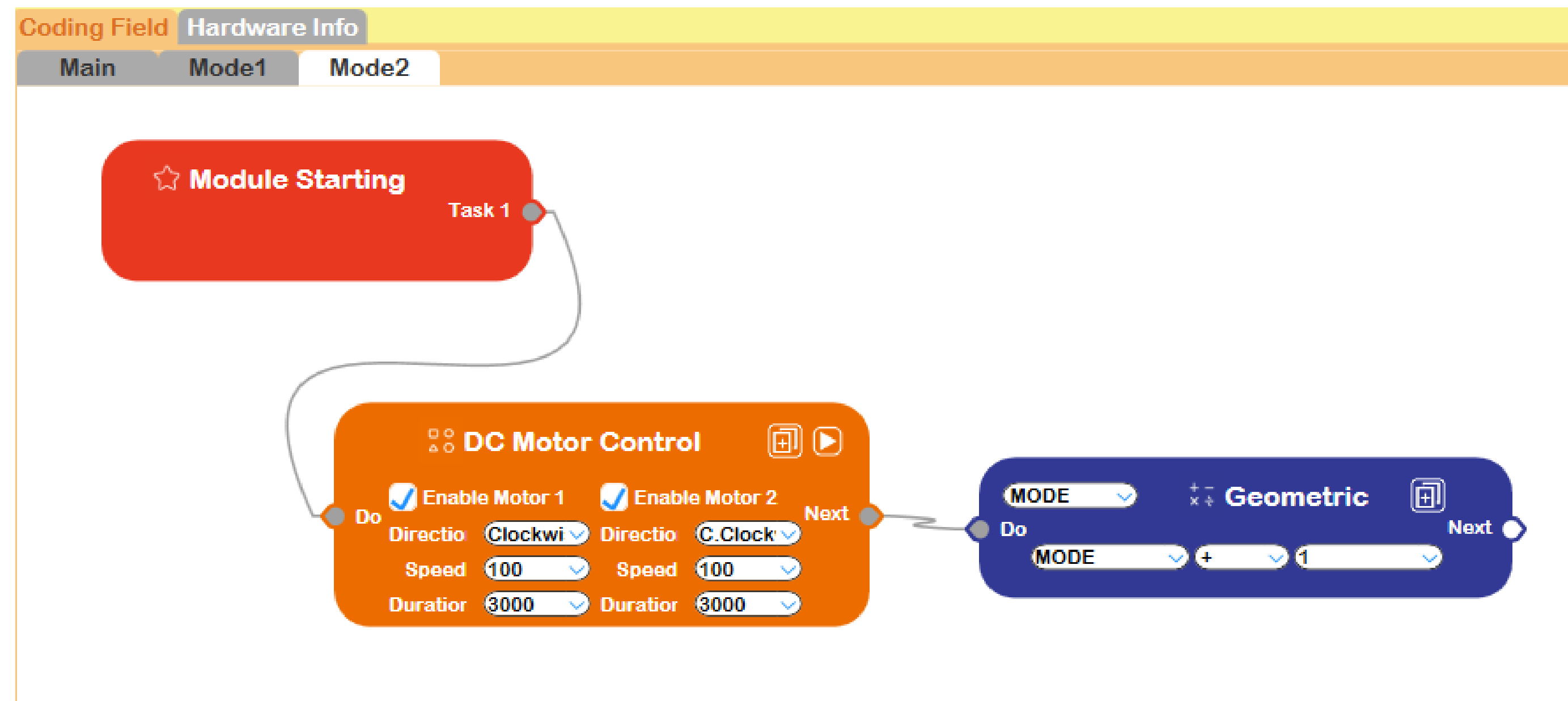
模式1



模式1(MODE=0): -part1

- 偵測到圍牆則右轉, 且mode+1
- 連續兩次右轉此時mode參數由原本的0變為2, 進入模式2

● 模式2



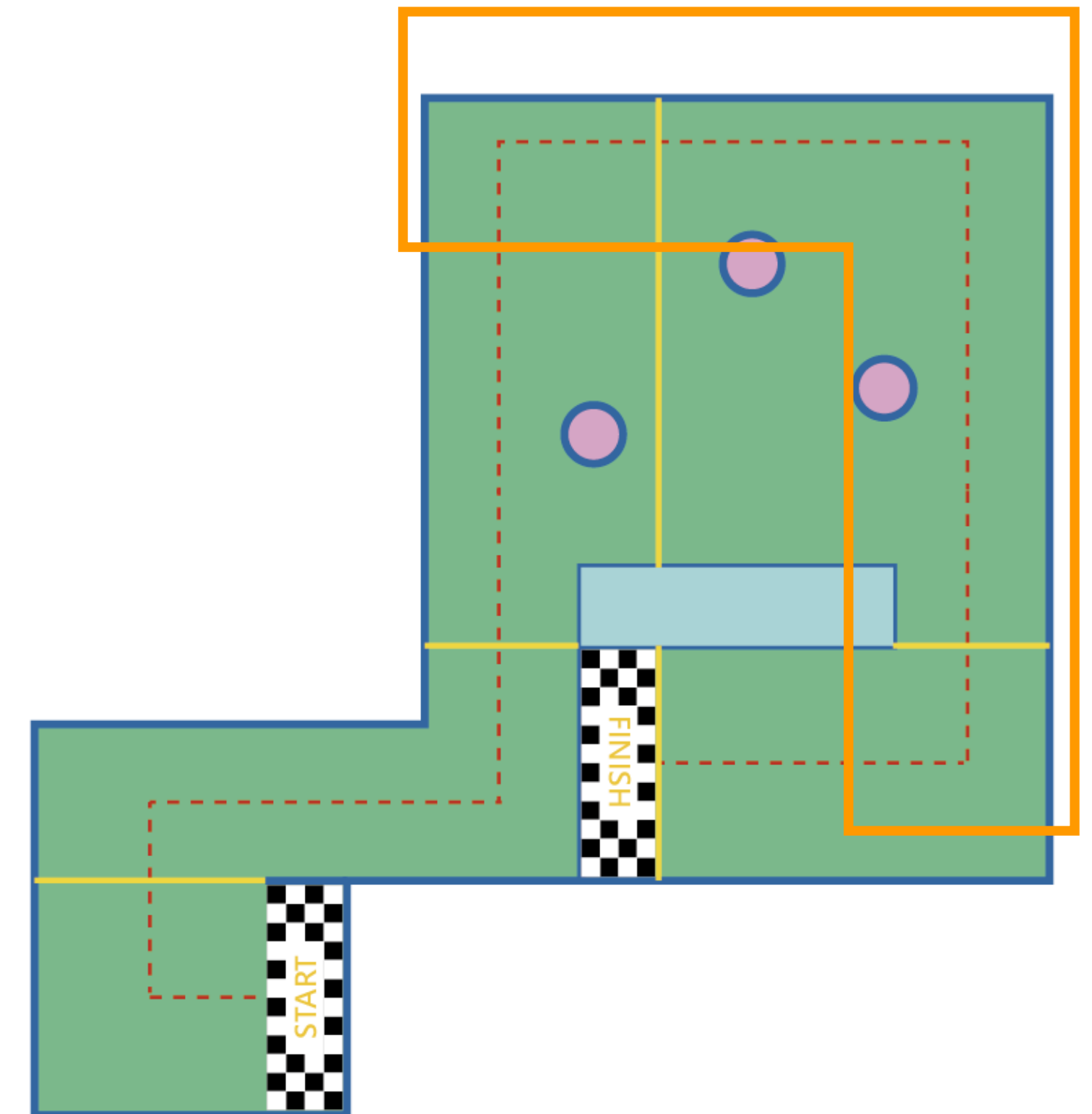
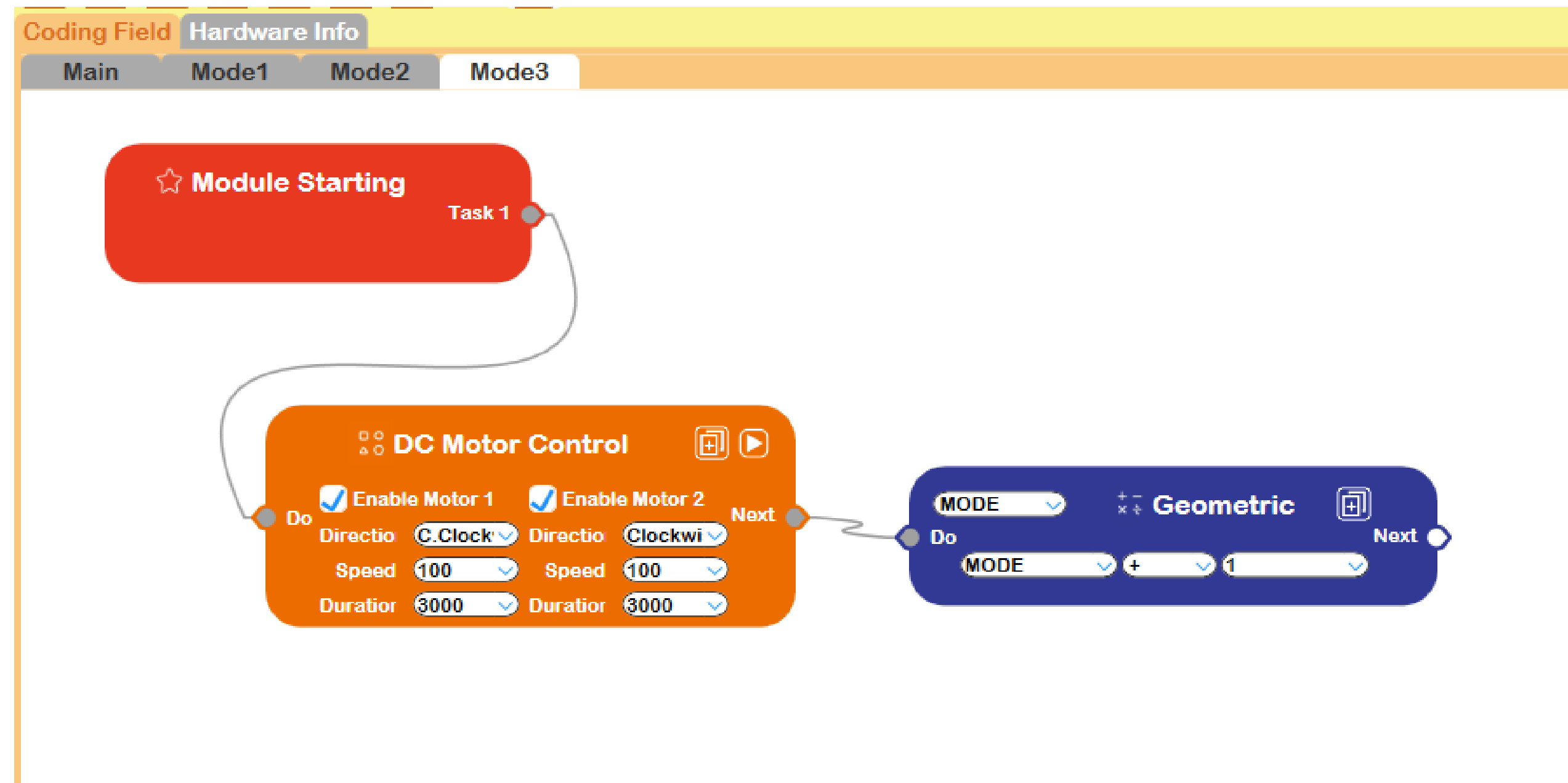
模式2

模式2(MODE=1):

- 先左轉90度, 繼續直線向前
- 左轉時, 模式+1, 進入模式3

● 模式3

模式3



模式3(MODE=2):

- 偵測道跑到圍牆, 向右修正
- 直到偵測下一次圍牆, 再次向右修正
- 沿著跑道左側走向終點

潛入基地任務：GOOD LUCK!!

A. 比賽時間: 比賽全程計時不暫停，時限 5 分鐘

B. 規則

1. 賽前有 90 分鐘為自走車調教時間，比賽前每個隊伍需要將調整完並參賽的車子交由大會工作人員保管，到該隊伍上場前由工作人員交回給該隊隊長
2. 比賽以得分制，每踩一點可獲 20 分，終點 20 分，完成共得 100 分
3. 於時限內利用最短時間完賽隊伍獲得第一名，取前三名

● STAFF

新莊比賽準備:

- 獎盃/獎牌: iKey
- 迷宮場地道具: iKey
- 教室場地確認....Kenneth
- 確認參與學生
 1. Claire – 竹圍國中、柑園國中、加欣
 2. Kenneth – 新莊國中
 3. Maggie – 中和國中
 4. iKey – 江翠國中
- 當日的工作分配
 1. 早上教學 : Claire
 2. 主持人 : Maggie
 3. 計時裁判(張群)、更新比賽紀錄(昀錡)、主判定裁判 (語婷)
 4. 場佈 & 器材 : iKey、Kenneth
 5. 早上樓下駐點引導進入會場 : 張群、昀錡
 6. 來賓: Turner
- 材料
 1. 引導的箭頭列印、膠帶、
 2. 裁判哨子、碼表

