參賽隊伍人員及機器人簡介
Team Member and Robot Introduction

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貳、機器人簡介

一、構想與策略分析

1. 構想：本次比賽的題目主要為救災任務，機器人的設計理念就是要穩、要準，因為當災難發生時機器人如果不穩定，將不會是救人而是被救。因此在設計上求穩而非求快，先能救到麒麟娃娃，再來要求救災的速度。機器人要能上階梯、搬東西、閃東西還有救娃娃，其所需的功能都必須要有其機構來搭配完成。

Idea: The topic of the competition for the relief mission, the robot's design philosophy is to steady, to associate, because the robot if unstable, will not save lives but rescued when a disaster occurs. Wanted stability rather than seeking fast design the first able to save to the unicorn doll, again asked the speed of the relief. Robot to be able to on the ladder, moving things, flash something there to save the doll, its

required functions must have institutions with completed.

一、 2. 策略分析：

1. 路線規劃：

沿著場地黑線尋線行走，先上高台後走向救援區救援；再來避開直立水管障礙物後走向救援區救援；最後循線行走到木箱的放置位置，並使用ＲＧＢ顏色感測器確認可以對準放置區，放置木箱後走向救援區救援。

Route planning:

Hunt walking along the venue black line, first toward the high-relief zone rescue; come back to avoid vertical plumbing obstacles towards the rescue zone rescue; the last walking through the line to the wooden box placement, and use the RGB color sensors confirm placement area can be aligned and placed wooden box toward the rescue zone rescue.

2. 上４０公分高的台階

四動力輪固定於地面，機器人主體做Ｚ軸垂直上下抬升，機器人前後兩排的輪胎可做獨立上下抬升，以可完成上高台之任務。

On 40 cm high step

Four momentum wheels fixed on the ground, the robot main body to do the Z-axis perpendicular to the upper and lower uplift, the robot around the two rows of tires do separate the upper and lower uplift, to be completed on the high-profile task.

3. 閃避障礙物

使用沿牆法，場地上將會有三支位置不同的直立障礙物，雖然擺放位置為對手所擺放，但距離分隔牆最近的點與牆壁之間，尚有將近八九十公分的距離，倘若機身不是很寬，沿牆法將會是非常穩健的方法。

Dodge obstacles

Along the wall method, the venue there will be three different positions upright obstacles, although the placement of the opponents are placed, but the distance between the separating wall nearest point and walls, there will be nearly 90 cm distance if the body is not very wide, along the wall method will be a very robust method.

4. 搬運落石（木箱）

仿照堆高機的抬升機構，當機器人對準木箱後，機身上升將木箱抬起，運用機器人前方的顏色感應，確切的將木箱擺放在正確位置。

Handling rockfall（wooden box）

The modeled to heap high machine uplift institutions When the robot alignment wooden box, the fuselage rise lift the wooden box, the use of the robot in front of the color induction exact wooden box placed in the correct position.

5. 夾麒麟娃娃

夾爪X軸方向移動，從中到左；從左到右，一次將三支娃娃夾完，夾具做大一點可提高穩定性避免誤差值，一次夾三支後再做分類也較為省時。

Folder unicorn dolls

Jaw X-axis direction, from left; From left to right, the first time the three dolls clip finished fixture bigger point can increase the stability to avoid errors, time folder three before making

classification more provincial.

6. 分類娃娃

藉由顏色感應，靠地心引力的力量，讓娃娃左右往下滑來做分類。

Classification doll

Induction by color, by the force of gravity, so that the baby sliding down to do so classified.

7. 置放娃娃

每次娃娃接夾完後，存放於機身上的籃子，９隻娃娃全部夾完後，再移動到放置台前，再將娃娃一次全部放置於放置台上，省去每夾完一次就要放一次的時間。

Placement doll

Each doll then clip after deposited in the body of the basket the nine dolls all folders after, and then move to place the front of the stage, and then the doll once all placed on placed on stage, eliminating the need for each folder Once necessary to put once time.

二、 機構設計

1. 上４０公分高台

A. 使用前排兩輪與後排兩輪進行上下抬升，以達到機器

人Z軸方向的移動。

B. 藉由車窗馬達旋轉齒輪來帶動結合鏈條的軸承來上下

移動，可使機器人完成任務。

On 40 cm high

A. Use the front two vertical uplift and rear two,

in order to achieve the robot movement of the

Z-axis direction.

B. bearing bonding chain is driven by the rotation

gear of the window motor to move up and down to

enable the robot to complete the task.

2. 避開直立水管障礙物

A. 使用沿牆法行走，使用距離感測器（超音波或紅外線）

來偵測隔板牆壁，沿著牆壁行走。

B. 沿牆法較能準確的避開障礙物，雖然在速度上可能比較

慢，但成功率相對是比較高的。

Avoid the upright water pipe obstructions

A. Use walking along the wall method using distance

sensors (ultrasonic or infrared) to detect the

partition wall, walk along the walls.

B. along the wall method is more accurate to avoid the obstacle, although the speed may be slow, but the success rate is relatively high.

3. 循場地黑線行走

A. 在固定輪胎的前排底板下方設置9顆光源感測器。

B. 以中間算起左右共7顆光源感測器，其用途為尋找場地五公分厚的黑線，使機器人準確移動到我們所指定的位置。

C. 則最左右兩側設定為記數器，做為定位與轉彎使用。

Follow the black line of the site to walk

A. In the the fixed tires front row below the floor set the the nine light sensor.

B. about the middle of counting a total of seven light sensor, its purpose is to find the venue five centimeters thick black line, so the robot to accurately move to the specified position.

C. is the most left and right sides set for the counter, used as a positioning and turning.

4. 搬運落石（木箱）

   A. 參考堆高機的抬升機構，使用鋁板在上下抬升的機台前方，向下延伸至離地 2.5 公分處固定。

   B. 藉由前後排輪胎上下升的功能將木箱抬起，使用輔助輪前方的ＲＧＢ感測器判斷白色區塊，使機器人知道位置並且準確放好木箱。

Handling rockfall（wooden box）

A. Reference Stacker uplift, the use of aluminum in the uplift of up and down in front of the machine, extending down to 2.5 cm from the ground at fixed.

B. by the function of the front and rear tires liter up and down the wooden box lift, use the auxiliary wheel in front of the RGB sensor to determine the white block, the robot know the location and accurately put away the wooden box.

5. 救援麒麟娃娃

   A. 關卡任務中的三隻娃娃，分別在座標０，５０，１００公分的地方，思考設計使用 x 軸移動的手臂。

   B. 藉由軌道的左右伸展，讓機械手臂可以大大縮短長度

以符合１００公分的機器人尺寸規則限定。

C. 向左向右橫移時可以使機器手臂長度伸展至足夠夾娃

娃的寬度，也能涵蓋誤差值。

Rescue unicorn doll

Three dolls, A. checkpoints task coordinates 0,50,100

cm, respectively, to think about design using the

x-axis arm.

B. by the left and right stretch of the track, so that

the robot arm can greatly shorten the length to meet

the 100 cm the robot size rules limited.

C. left to right traverse the machine arm length

stretch to enough folder doll width, can cover the

error values.

6. 將麒麟娃娃分類

A. 機器手臂的三個夾爪，夾完三支娃娃後，將手臂位置

移至機器人中央後，向後旋轉至分類平台的ＲＢＧ感

測器正上方來辨別顏色。

B. 運用地心引力的特性，夾爪向左向右移動，讓娃娃能

夠順著軌道滑落到左邊的籃子或右邊的籃子，來做一

個不同顏色的區別與擺放。

Classification of the unicorn doll

A. three robotic arm gripper folder finished three dolls, robot arm position to the central rotating back to just above classification platform RBG sensor to distinguish between colors.

B. use of the characteristics of gravity, the jaws move left and right, the doll slipped down the track to the left of the basket or the right side of the basket, to do a different color distinction and placed.

7. 分類籃子

A. 將長木板裁切成所要的尺寸大小來製作外框。

B. 使用較輕的網子或是牛皮紙來罩住框架，且在底版部分設置可開合的面使娃娃可掉落至放置台。在籃子中間設置隔板做為紅色綠色的分別所用。使用活葉片將籃子跟機身連接，使其可以倒向放置台達到放置娃娃的功能。

Categories basket

A. The long plank cutting into a desired size to produce the outer frame.

B. to use lighter nets or kraft hooded framework the doll can drop to place the station, set the opening and closing of the surface and the bottom plate part. Set in the basket intermediate separator used as red and green, respectively. Use the live blades connected to the basket with the fuselage, and it can Backward placed Taiwan doll placed.

三、 輪子驅動設計

使用１２Ｖ直流電、轉速１６０ｒｐｍ的電動馬達來帶動１２ｃｍ的顆粒表成塑膠胎最為動力輪。其輪胎的抓地力比較好可以應付場地的平滑，使機器人不至於打滑導致錯誤的產生。

Wheel drive design
12V DC speed 160rpm electric motor to drive the 12cm particulate table into a plastic tire most power wheel. The tire grip is better able to cope with the smoothness of the venue, the robot will not slip cause errors.

四、 電路設計

將 ＢＣ２晶片安裝置自製的電路板上，將二十八個腳位外接出來供應感測器所需使用；將正負極兩個腳位外接至轉換器上，將１

２ｖ轉換成５ｖ並連接至配電電路板上，以供輸出高電流供應給感測器使用；將四個腳位延伸給１０個馬達驅動器使用。在配電板與供應動力輪電力的電池之間，安裝一個開關；在開關與電池之間，安裝一個保險絲，避免當機器人發生故障時，導致機器人將的控制晶片、馬達驅動器、感測器、電路板電路以及電池造成損壞。

Circuit design
BC2 chip security device homemade circuit board, the twenty-eight-pin external out to supply sensors required; positive and negative two-pin external converter, convert the 12v to 5v and connected to the power distribution circuit board for output high current supply to the sensor; extending four pin to 10 motor drive. Between the power of the battery in the power distribution board and the supply power wheel install a switch; installed between the switch and the battery, a fuse, to avoid when the the robot fault occurs, leading to the robot to the control chip, the motor driver, sensors, circuit board circuit, as well as cause damage to the battery.

五、 感測器設計(遙控組無免填)

尋黑線：９顆光源感測器，７顆為尋黑線並使機器人能準確的走在黑線上，左右兩顆為記數器，來判斷位置與轉彎。

麒麟娃娃分類＆對準救援區＆將木箱放置於白色區塊：使用ＲＧＢ顏色感測器來判斷。

避開障礙物：運用距離感測器（紅外線感測器）來偵測機器人與分隔牆之間的距離來搭配沿牆法的策略。

Sensor design (remote group no premise)

Find black line: the nine light sensor, 7 to find the black line and the robot can accurately walk in the black line, around two for the counter to determine the position and turn.

Unicorn doll Classification & alignment Rescue District & wooden box placed on the white blocks: using the RGB color sensors to determine.

Obstacle avoidance: the use of distance sensors (infrared sensor) to detect the distance between the robot and the separating wall along the wall law with strategy.

六、 組裝、測試與修改

機器人大部分的材料是使用鋁框組成，將鋁框裁切成我們所要的

ＳＩＺＥ，再利用Ｌ鐵和腳鐵以及螺絲、螺帽，將機器人拼湊組

合而成，將馬達安置後裝上動力輪，先做簡單的配電測試前後行

走以及轉彎，觀察機器人是否穩定，若不穩定再將其問題做一個

修正。

Assembly, test, and modify
Robot most of the material is aluminum frame, cut into the aluminum frame SIZE we reuse L of iron and feet of iron as well as screws, nuts, patchwork robot, fitted with motor placement power wheel do first simple distribution test before and after walking and turning, observe the robot is stable, if not stable then make a correction.

七、 機器人創意特色說明

救台特讚隊，顧名思義就是台灣的救援隊，我們提倡一步一腳印，

穩扎穩打求精準。一次夾三支娃娃可以加快速度，夾完後可以將

手臂轉向後方邊行走邊分類，減少時間的浪費。一次夾完全部後

再放置於放置台上，可以節省時間也可以避免多次放置導致娃娃

被撞擊到地上去。

Robot creative Features Description
Save the stage special praise team, the name suggests is Taiwan's rescue team, we advocate step at a time, slowly and surely to seek accurate. The time folder three doll can speed up the folder after the steering arm to the rear side walk side classification, reducing the waste of time. Placed on the stage and then placed in the folder completed at once, you can save time but also to avoid repeatedly placed the doll was hit to the ground.

參、參賽心得

機器人學程創辦以來第二次參加比賽，相較於前次的參賽成績有

所進步，雖然這次有進前八強，但是在機構設計技術以及程式的

設計與撰寫上仍然有相當大的空間可以繼續加油努力。

Robotics process inception second race, an improvement compared to the previous competition results, although this time into the top eight, but can still considerable space in the institutional design techniques as well as the program's design and writingKeep up the good efforts.