

# 參賽隊伍人員及機器人簡介

## Team Member and Robot Introduction

組別：遙控組 自動組  
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### 貳、機器人簡介

#### 一、構想與策略分析

機器人構想：

看完比賽內容與規則後，期望能設計出一台穩定又能過關的機器人，求快速是最後更改設計時再求取。步行機構走起來得非常平穩，震動降到最小，手部要靈活操作。

策略分析：

比賽時間只有四分鐘，先前往山崩區救援，救援不吊掛纜車，並到土石流區救援玩到淹水區才型吊掛纜車，就走向出發去就覽車放置回救援區，若因在山崩區救援太久，則直接掛上纜車，並繞從淹水區斜坡回到出發點取下覽車放置救援區。但時間充足時就會按照第一個策略走完，重點在於控制者的技巧。

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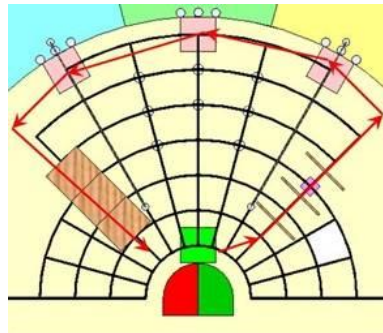
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Robot vision:

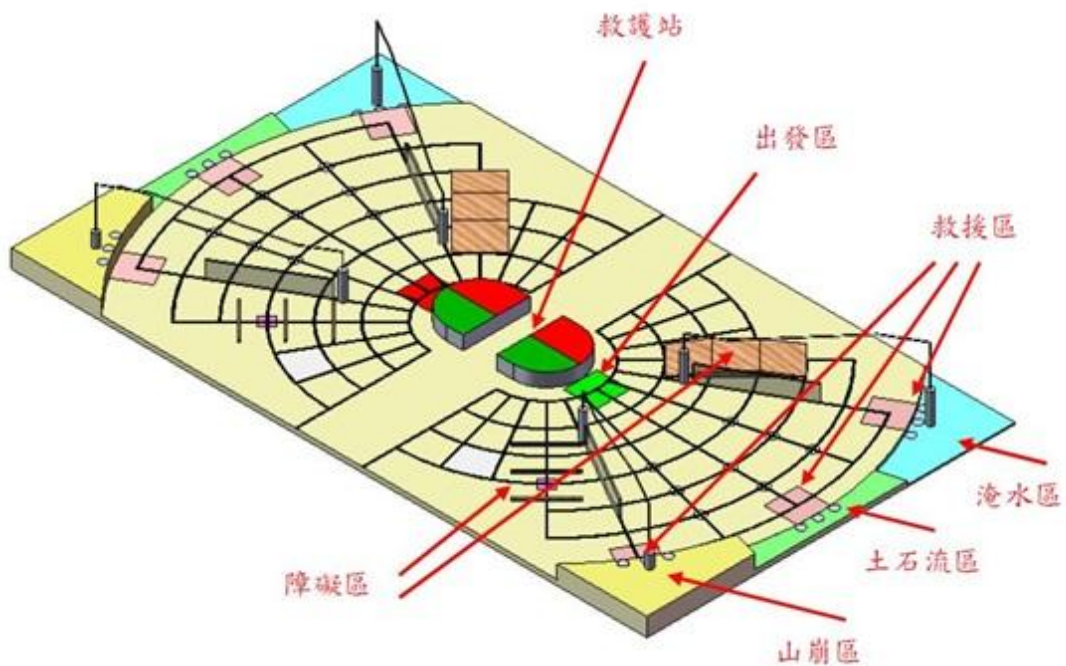
After watching the game content and rules, it is desirable to be able to design a stable robot can cross the border, and fast and then strike when the final design changes. Walk institutions go up very smooth, minimize vibration, hand flexible operation.

Policy Analysis:

Game time is only four minutes, first go to the landslide area rescue, relief is not hanging the cable car to the mudslide area rescue only play into the flooded field type hanging cable car, we walked back to the starting opinions on the Ferris wheel is placed back to the rescue zone result in landslides rescue area for too long, the direct mounting of the cable car, and around the from the slopes flooded back to the starting point to remove the Ferris wheel placed relief zone. Sufficient time will be completed in accordance with the first strategy, with emphasis on control skills.



圖左為比賽行進路線。



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### 二、機構設計

使用 Klann 連桿機構下去進行設計。Klann 連桿機構（圖 2-1）其是使用一組曲柄搖桿帶動一組雙搖桿機構，此組機構固定各桿結位置大部分使用 C 型扣環（圖 2-2），螺絲只用於固定機體本身。

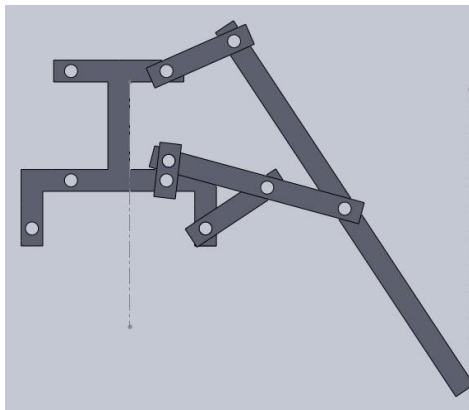
手臂夾爪運動機構：

手臂（圖 2-3）為了配合比賽能升高兩公尺高而設計，設計為三段，兩段手臂一段夾爪，使他能有升高兩公尺高的能力。底盤設計為四個萬向滾珠軸承頂住底盤及一個深溝滾珠徑向軸承來確保軸的徑向轉動。夾爪及掛鉤設計（圖 2-4），夾爪救援直接以套取方式（圖 2-5）夾取，較為簡潔方便。（圖 2-6 為夾爪內部。）

The Klann linkage mechanism down design. The Klann linkage mechanism (Figure 2-1), which is a group of crank rocker driven by a group of double-rocker mechanism, this group of institutions fixed rod junction position most of the C-type retaining ring (Figure 2-2), screws only for fixing the body itself.

Arm gripper motion mechanism:

The arm (Figure 2-3) to tie the game can rise two meters high and designed three sections, two sections of the arm section of the jaws, so that he can rise two meters high ability. Chassis design for the four universal radial ball bearings to withstand the chassis and a deep groove ball radial bearings to ensure the shaft rotation. Jaws and hook design (Figure 2-4), the jaws gripping relief directly to the taking of the way (Figure 2-5), the more simple and convenient. (Figure 2-6 jaws internally.)



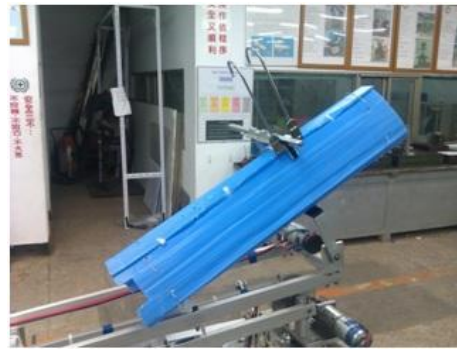
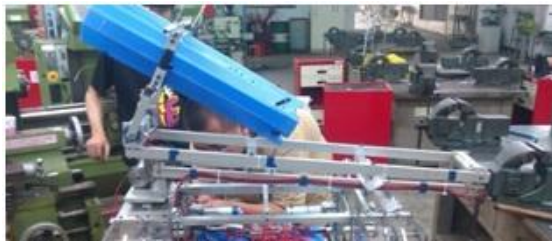
（圖 2-1）KLANN 連桿組。

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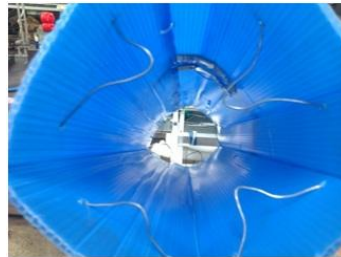
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(圖 2-2) C 扣固定位置。



左 (圖 2-3) 手臂夾爪機構。右 (圖 2-4) 夾爪。



左 (圖 2-5) 套曲動作。右 (圖 2-6) 夾爪內部。

### 三、輪子驅動設計

步行機構為四組機構裝配於四個角落，各自馬達驅動曲柄搖桿機構的曲柄，所以在前進時馬達得一邊正轉一邊反轉，於轉彎時分成左右兩組得向同一方向旋轉運行。(其控速為使用馬達驅動器運行)。

The walking mechanism fitted to the four corners of the four groups of institutions, the respective motor drive crank crank rocker mechanism, so the motor in the forward side of the forward side of the reversal, in turn, is divided into left and right groups to run in the same direction of rotation. (Speed control motor drive is running).

### 四、電路設計

因為是遙控組所以使用市售的 Arduino 控制板，使用程式控制及馬達驅動器控制馬達轉速，另外手臂是使用伺服機下去轉動控制，其可定位角度，並只要利用程式進入控制板



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再輸出至各驅動器帶動。控制器先以有線遙控為設計基礎，接著使用無線 PS2 搖桿，利用組合按鈕避免誤觸，所以按鈕皆寫自鎖，因此驅動時不會互相干擾動作。

Arduino control board using a commercially available remote group, using the program control and motor drive control motor speed, another arm servo down turning the control, which can be positioned angle, and as long as the program to enter the control panel and then output to driven. The basis for the design wired remote controller first, then use a wireless PS2 joystick, to avoid inadvertently using a combination of buttons, so the buttons are to write a self-locking, so the driver will not interfere with each other when the action.



左圖為 Arduino 控制板。右圖為馬達驅動器。



左圖為搖桿。右圖未接收器。

## 五、感測器設計(遙控組無免填)

## 六、組裝、測試與修改

參與比賽前的製作試驗過程，就發覺了許多錯誤設計以及有些零件易損壞，於是在比賽時，於每一場比賽完畢更換零件。經由此次參賽與製作，了解看似簡單的物品，卻很難做得出來，由於在比賽前的試驗導致手臂馬達軸心斷裂，而未購買備品，而臨時更改為只單存夾取，卻也得到了不錯的成績。因其步行機構穩定及操控手的靈活控制。

當初先使用 5A 的馬達驅動器，發現電源通了以後，馬達驅動器在 30 秒內變得非常燙，因此考慮 30A 的，但是還是會過熱，只是相較 5A 可以多撐大約 4 分鐘，但是我們認為還是不夠，所以我們的改良方法是加上散熱片，加上後，可以跑 10 分鐘以上，而且散熱非常快。至於手的馬達驅動器，因為手還有加上扭矩會讓馬達的附載更大，因此我們直接使用 50A 的馬達驅動器。使用有線的 PS2 搖桿來做遙控器，有一個問題，就是線不夠長所以使用無線的，其只差別於多一個接收器，程式寫法一樣。

Involved in the game before making the test process, we find that many errors of design as well as some parts are easily damaged, so in the game, after every game replacement parts. Through the

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competition with production to understand the seemingly simple items, it is difficult to work it out, cause the arm motor shaft fracture in the test before the game, without purchasing a spare, but temporary change only a single deposit gripping, but also get good results. In his walk institutional stability and control of flexible control of the hand.

The first place to use a 5A motor drive, and found that power through the motor drive in 30 seconds to become very hot, so consider 30A, but still overheating, just compared to 5A can hold about 4 minutes, but we believe it is enough, so our improved method is coupled with the heat sink, plus go after, can run for more than 10 minutes, and the cooling is very fast. As regards the motor drive of the hands, because the hand there are coupled torque makes the motor attached to larger, we directly use 50A of the motor drive. PS2 joystick do use wired remote control, a problem is that the line is not long enough, so the use of wireless, the only difference between a receiver program written.

### 七、機器人創意特色說明

特色在於固定步行機構連桿組使用壓克力板，雖然笨重卻剛性足夠，卻也少了軸承的使用，也使壓克力板擴孔。還有固定各桿件大部分街為C型扣環配合磨光圓棒車小溝槽，很少使用螺絲固定。而全部的聯軸器接使用剛性連軸器，沒有撓曲性，這也要機構嘉工配合構精密才可使用，很少人敢這麼使用。我們這台機器人的特色就是敢用別人不敢用的辦法，卻還是有辦法運作。

The characteristics lies fixed-walking Linkages Group acrylic sheet, although cumbersome, but rigid enough, but also less use of the bearing, acrylic sheet reaming. There are most of the fixed rod Street, C-type clasp small trench with polished round rod car rarely use screws. And all couplings connected using rigid coupling, no deflection of the, also institutions Ka working with the configuration precision before use, few people dare to use. Features of this robot is to dare to use others dare not approach, but still have a way to work.

### 參、參賽心得

參賽的過程中接觸了許多事物，學習了與工作夥伴的相處溝通和許多新的知識與加工方式，在過程中看到其他隊伍摩擦與紛爭，導致隊友之間的對峙及排斥這些情況，看回自己與隊友間的小摩擦紛爭可以順利的解決感到非常得慶幸，而在比賽會場中看到了許多不曾想過或不曾看過的機構，也看到許多雙胞胎的出現，比賽過程中看到許多的隊伍因為機構的損壞或規則上的關係而落敗，不知為何都會為他們感到可惜，是對他們期望很大而感到落寞和可惜。

Contact with many things in the process of participating, learning to get along with working partners to communicate and new knowledge and processing methods, see the other teams in the process, friction and disputes, led to the confrontation between teammates, and exclusion of these cases, we look back at small friction and disputes between himself and his teammates solution was very very glad to see many institutions have never thought of or never seen in the competition venue, also saw the emergence of many twins see many teams in the competition process because of damage to the mechanism or rules and lost, I do not know why they feel a pity, great expectations for them to feel lonely and pity.