

# 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 指導老師：吳明瑞老師  
學校名稱：明新科技大學 (School：) Mingshin University of Science and Technology  
隊伍名：MUST O&E (Team name：) MUST O&E

### ※內容需中、英對照※

#### 壹、參賽隊伍人員：

- 一、指導老師：吳明瑞(WU, MING-RUEI) 老師
- 二、組員：葉健治(YE, JIAN-JHIH)、莊育獎(CHUANG, YU-CHIANG)  
陸偉強(LU, WEI-CIANG)、許東勛(HSU, TUNG-HSUN)

#### 貳、機器人簡介

##### 一、構想與策略分析(Vision and strategy analysis)

依照這次競賽規則及場地需求，經過討論後決定以機動性為機器人製作的原則。速度、準確、機動性以及穩定都是主要的因素，比賽有三關，依題目車身不能太大要考慮他的機動性，在構想設計時我們是先過土石流區、淹水區、山崩區抓取各關麒麟娃娃回起始區，依照此構思將機構逐步組裝、測試。

In accordance with the contest rules and space requirements. After discussion, decided to mobility the principle of production for the robot. Speed、accurate、flexibility and stability is a major factor. Game three tests. Topic car body

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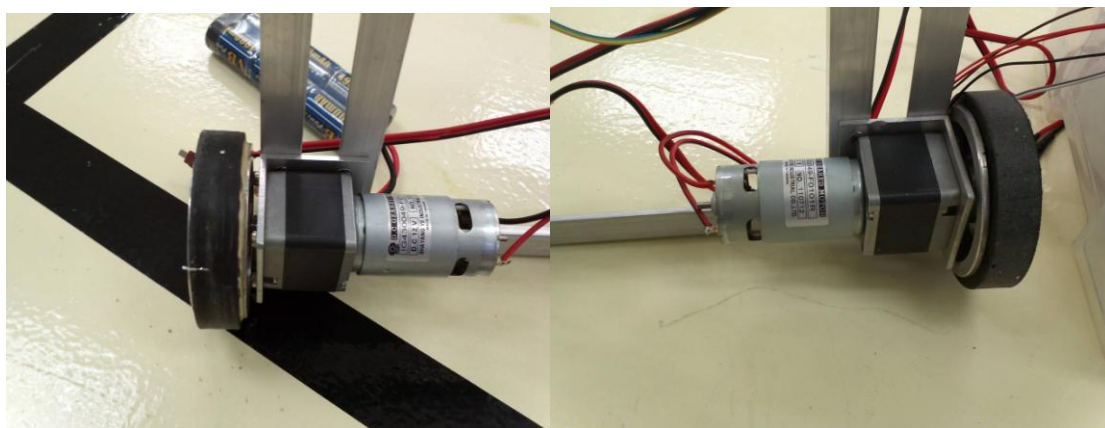
can not be too large consider his mobility. Conceived the design of we first over the mudslide area、flooded、Landslide area crawl respective related doll back to the starting area. According to the agency step by step assembly、test.

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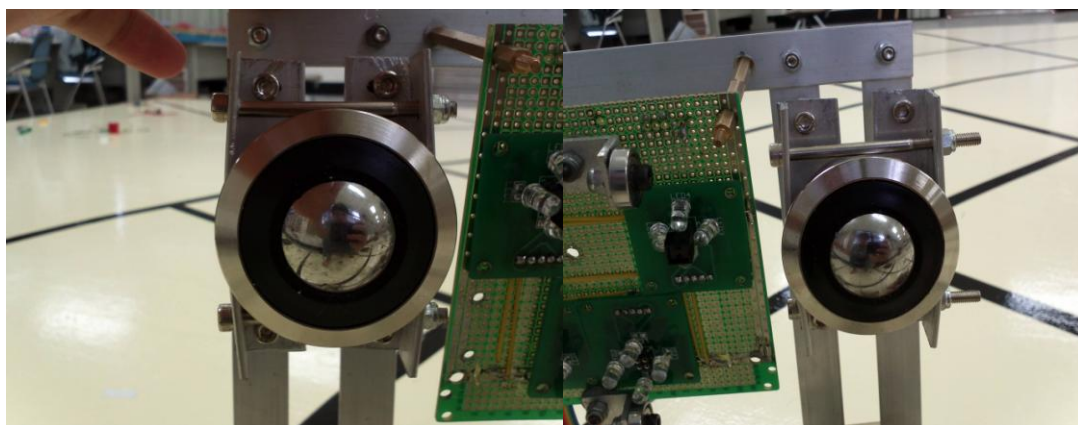
## Team Member and Robot Introduction

### 二、機構設計(Mechanism Design)

#### (1) 輪胎(Tire)



動力輪(Power wheel)：馬達(Motor)



輔助輪(Auxiliary wheels)：萬向輪(Caster)

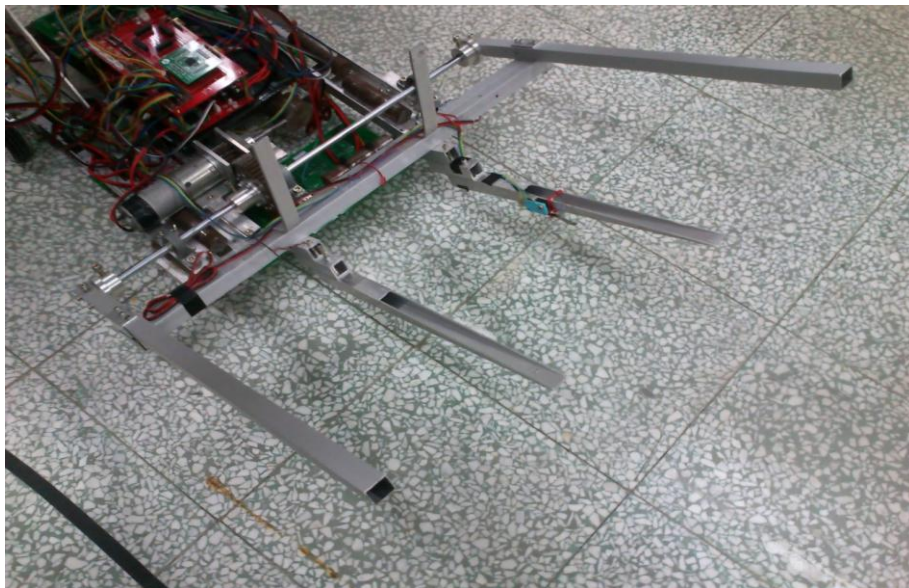
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(2) 淹水區(Flooded)&山崩區(Landslide area)：

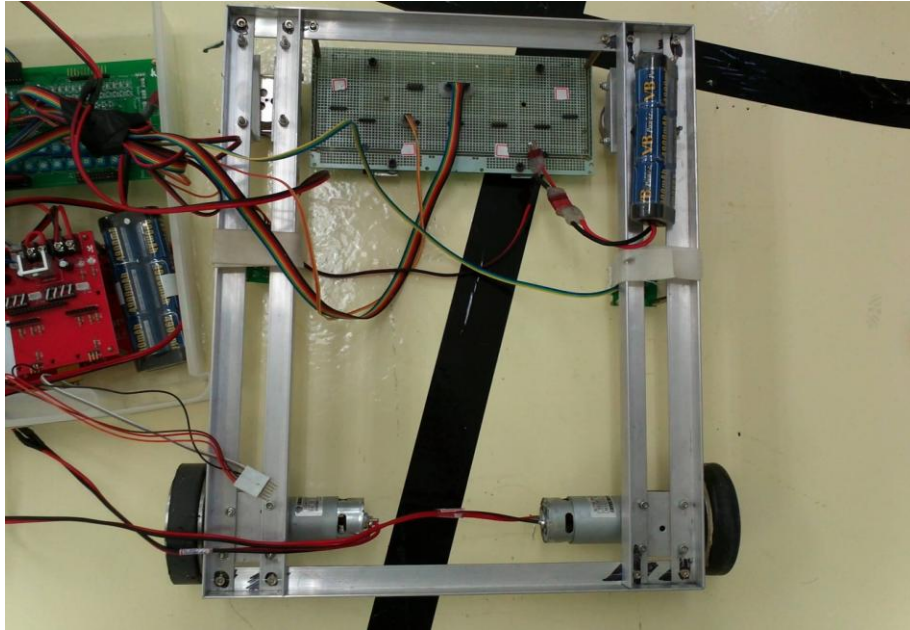
抬起落石的部份仿堆高機，跟上斷橋撐桿是採取同一結構來節省體積，撐桿作用為防止落石滑落。

Lift up rockfall most imitation stacker. On the broken bridge pole the same structure save the volume. struts role prevent rockfall slide.



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機構縮小，以利避障(Institutions reduced. obstacle avoidance)

(3) 夾爪(Jaws)

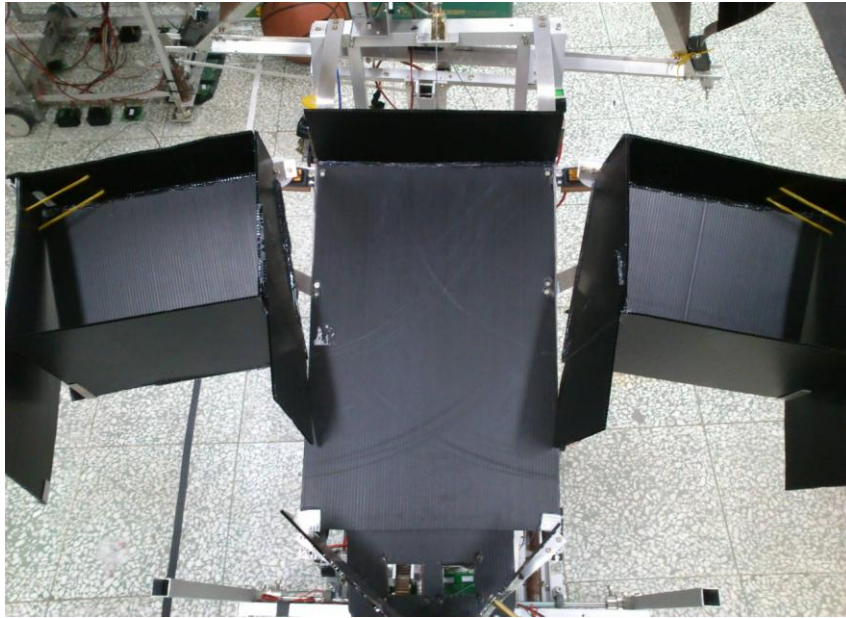


一次抓取三隻麒麟娃娃

(4) 收集&分類(Collect&Classification)

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收集的部分採流水閘道原理，運用珍珠板加工，快速成型，低成本，輕盈三大優點及於一身。分類部分使用CNY70感測顏色。

Collect part pick stream sluice channel principle. Use pearl board processing. Rapid prototyping .Low cost. Lite three advantages in a. Classified section use cny70 Sensing color.

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### 三、輪子驅動設計(Wheel drive design)

輪子驅動分為動力輪和輔助輪兩個部分

動力輪採用程式控制四種模式讓 MCU 送訊號給馬達晶片配合電池來推動車輪行走。

Wheel power wheel and auxiliary wheel drive is divided into two parts.

Power wheel using program-controlled four modes to the MCU send signals to the motor chip with the battery to promote wheels walking

一顆馬達晶片的控制佔用 MCU 兩位元，馬達晶片工作電壓高達 12V 以上，它輸出給馬達的正負極電壓是由程式來控制的，以下是程式控制馬達的工作模式：

Occupied the control of a motor chip MCU two yuan, the motor chip working voltage up to 12V, it is output to the positive and negative voltage to the motor is controlled by the program, the following is the operating mode of the program-controlled motor.

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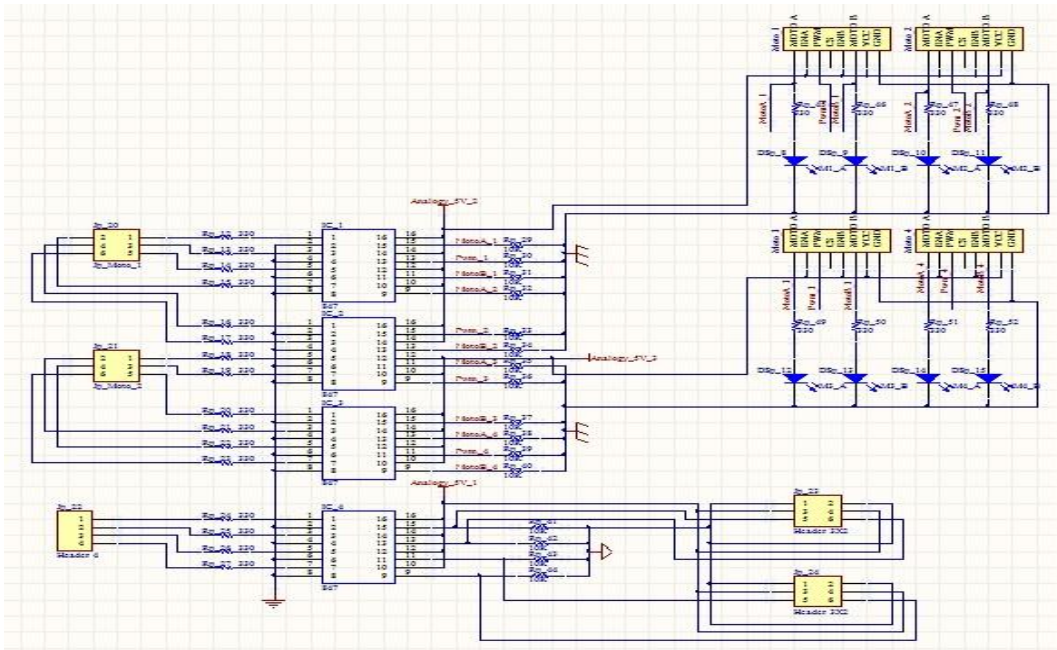
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程式輸入 數值		輸出電壓		馬達 動作
A	0	Out A	0V	停止
B	0	Out B	0V	
A	0	Out A	0V	逆轉
B	1	Out B	16V	
A	1	Out A	16V	正轉
B	0	Out B	0V	
A	1	Out A	16V	煞車
B	1	Out B	16V	

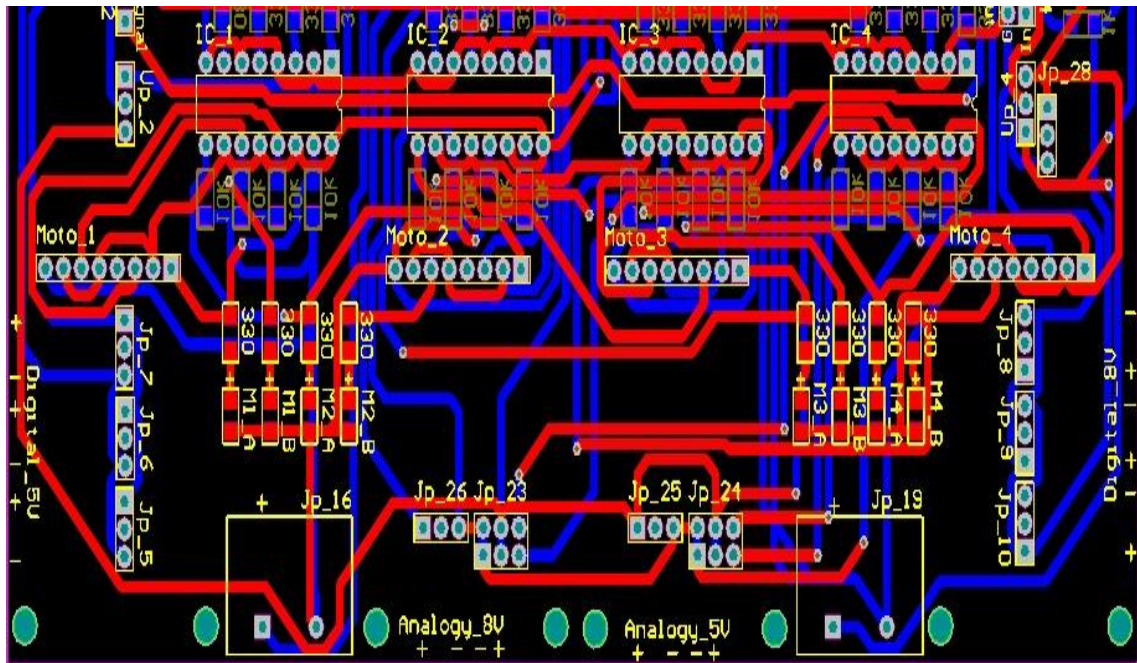


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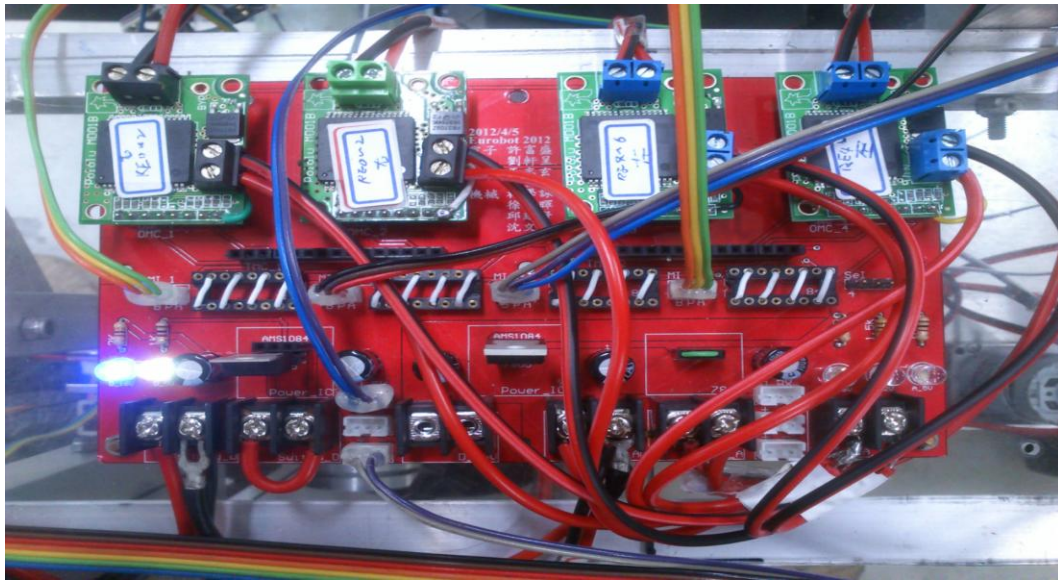
馬達驅動電路設計圖(Motor drive circuit design)



馬達驅動電路規劃圖(Motor drive circuit Planning Figure)

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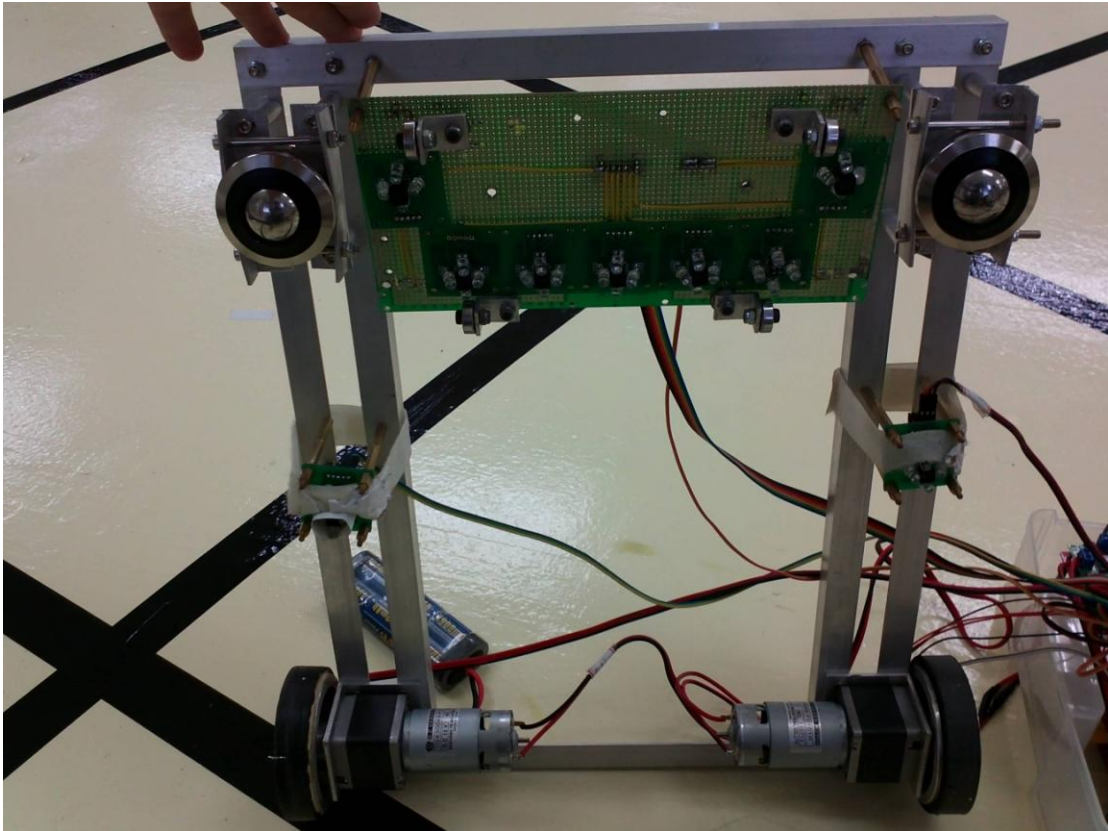
馬達驅動電路板(The motor drive circuit board)

輔助輪採用的是萬向輪以方便車體順暢的移動。

Auxiliary wheel is used in the movement of casters to facilitate smooth carbody

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車底圖(Car basemap)

#### 四、電路設計(Circuit design)

##### ◆電源電路設計(Power circuit design)：

一個電路的形成，電源扮演著重要的角色，設計良好可避免電子元件損壞，如果設計不良那後果不堪設想，而電壓分配一定要清楚明瞭，數位、類比一定要分開，不可共接地，因為類比電源直接輸出給直流馬達，數位電源則輸出給主控板和其他周邊電子零件，如果同時接地，會發生直流馬達的逆電流造成主控板重置。

The formation of a circuit's power plays an important role

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design good damage to electronic components can be avoided, if the design is bad that the consequences could be disastrous, the voltage distribution must be clearly understood, digital, analog certain to be separate, not be a total ground, because the analog power directly output to the DC motor, digital power output to the control board and other peripheral electronic components, if at the same time the ground caused by the reverse current of the DC motor control board reset happens.

### ◆ 電源供給分配(Distribution of power supply):

#### ✚ 一組 5V 穩壓電路(A 5V regulator circuit):

利用 8V 的鎳氫電池經由穩壓 IC 穩壓後得到類比電壓 5V，提供給伺服機所使用的類比電壓。

8V nickel-metal hydride battery via the analog voltage to 5V regulator IC regulator to provide the analog voltage to the servo.

#### ✚ 一組 5V 穩壓電路(A 5V regulator circuit):

利用 8 伏特的鎳氫電池經由穩壓 IC 穩壓後得到數位電壓 5V，提供給 Microchip—30F6015 以及一些周邊電路所使用的數位電壓。

8-volt nickel-metal hydride battery via digital voltage 5V regulator IC regulator of Microchip — 30F6015, and some peripheral circuits using digital voltage supplied to the.

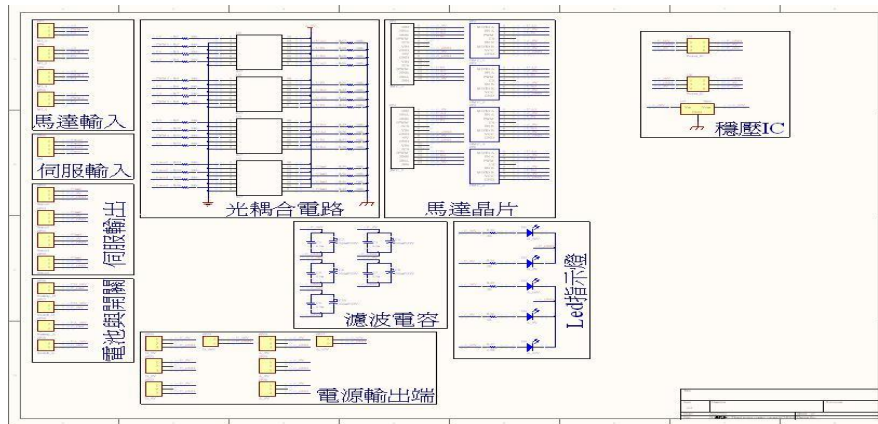
#### ✚ 一組 16V 類比電路(16V analog circuit):

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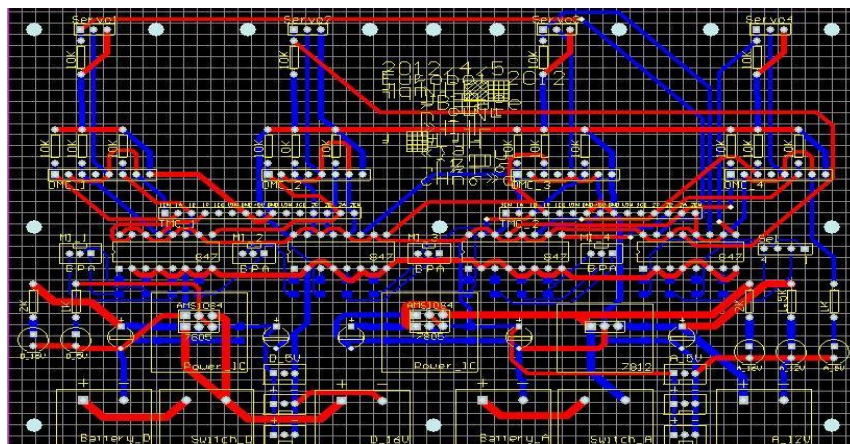
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利用 16V 的鎳氫電池作為行進馬達的電源。

16V a nickel-hydrogen battery as the power of the traveling motor.



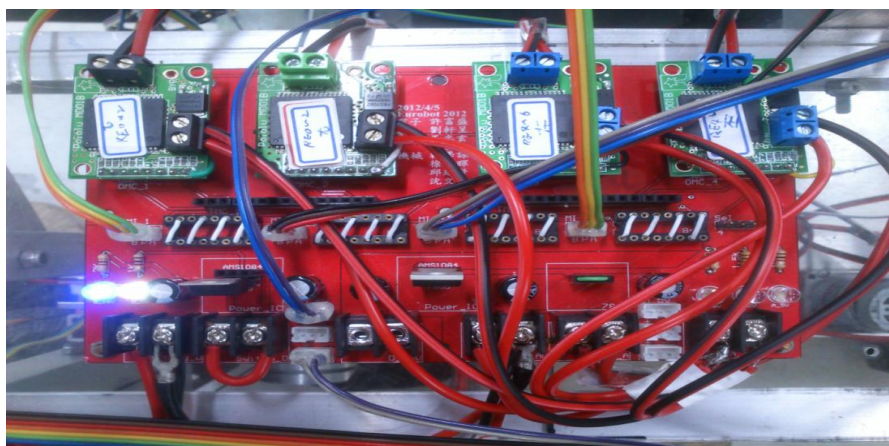
電源電路設計圖(Power circuit design)



電源電路規畫圖(Power circuit regulation drawing)

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電源電路板(The power supply circuit board)

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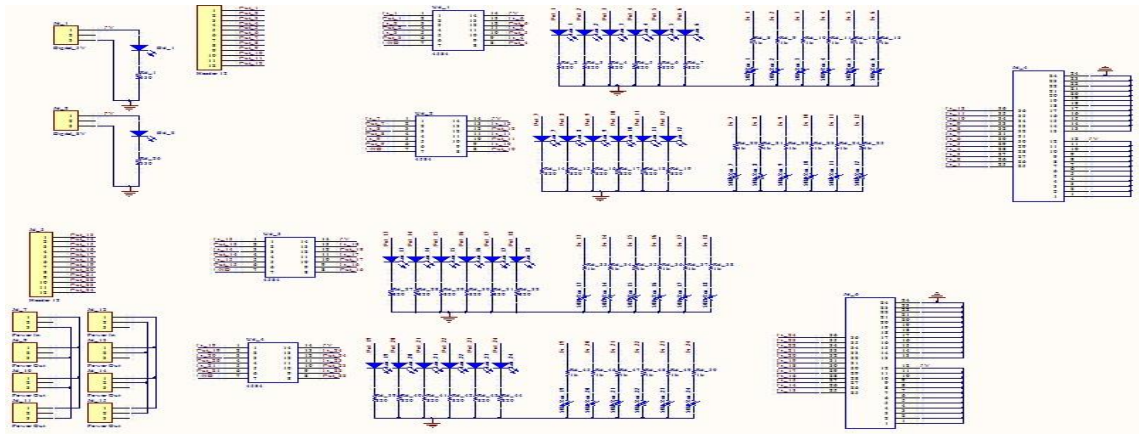
### 五、感測器設計(Sensor design)

感測電路是機器人行走的方向感測，當機器人行走偏離軌道時需要依靠感測電路之感測值配合馬達將其矯正回軌道上，還有抓取麒麟娃娃時分辨綠色或者紅色。感測電路分為感測器調整電路以及感測板電路兩部份，感測電路負責接收感測訊號並將其轉送給MCU，感測板電路架設於車體底盤下是要將感測路段的訊號回傳到感測器電路，提供黑、鵝黃色或紅、綠色的辨識。

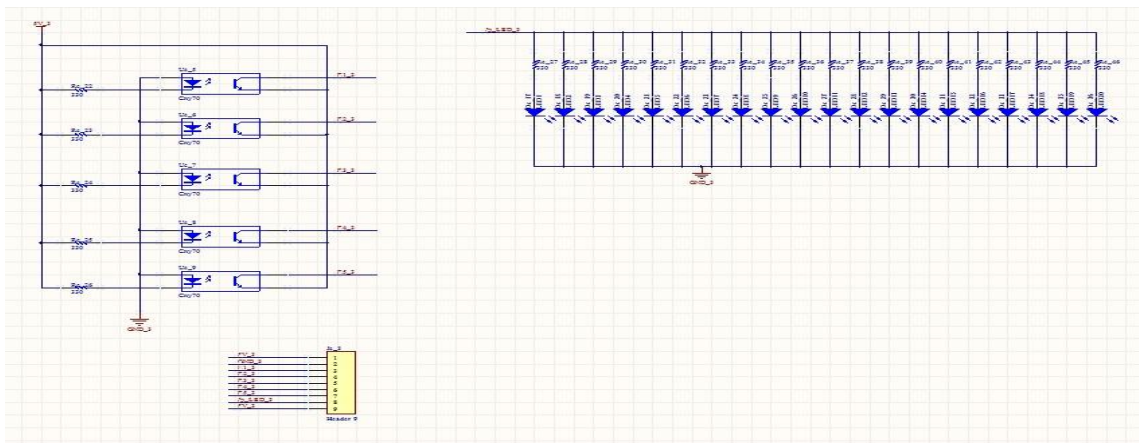
The sensing circuit direction sensing robot walk sensing circuit sensing values need to rely on when the the robot behavior away from the track, with the motor be corrected back to the track, and crawling unicorn dolls to distinguish green or red. Sensing circuit is divided into the the sensor adjustment circuit and sensing plate circuit two parts, the sensing circuit is responsible for receiving sensing signals and forwarded to the MCU, The sensing board circuit erected in the car body chassis To sensing circuit segment of the signal back to the sensor circuit to provide black, yellow, or red, green.

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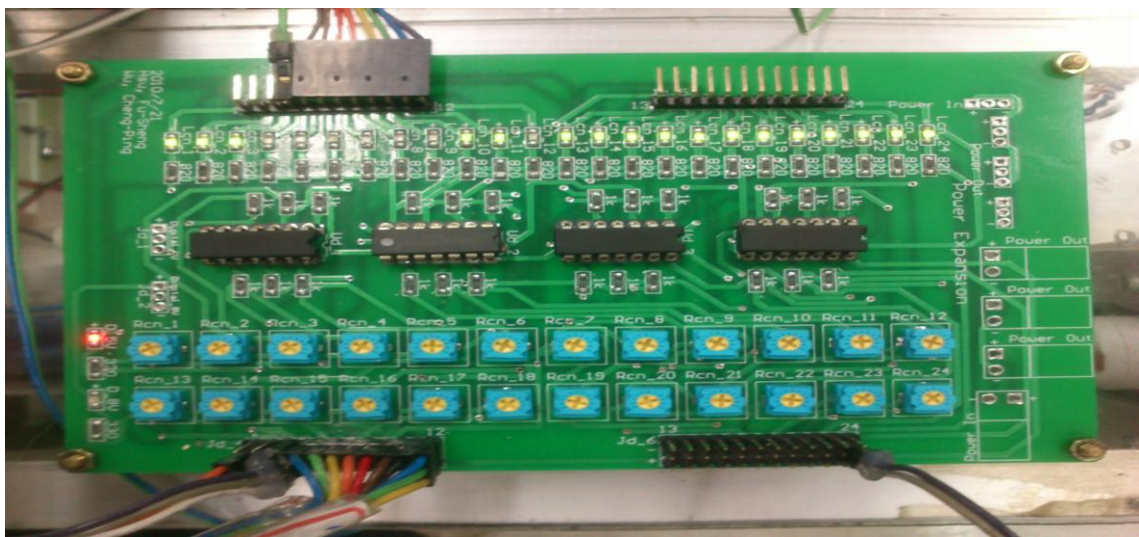
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感測器調整電路設計圖(Sensors to adjust the circuit design)



感測器設計圖(Sensor design)

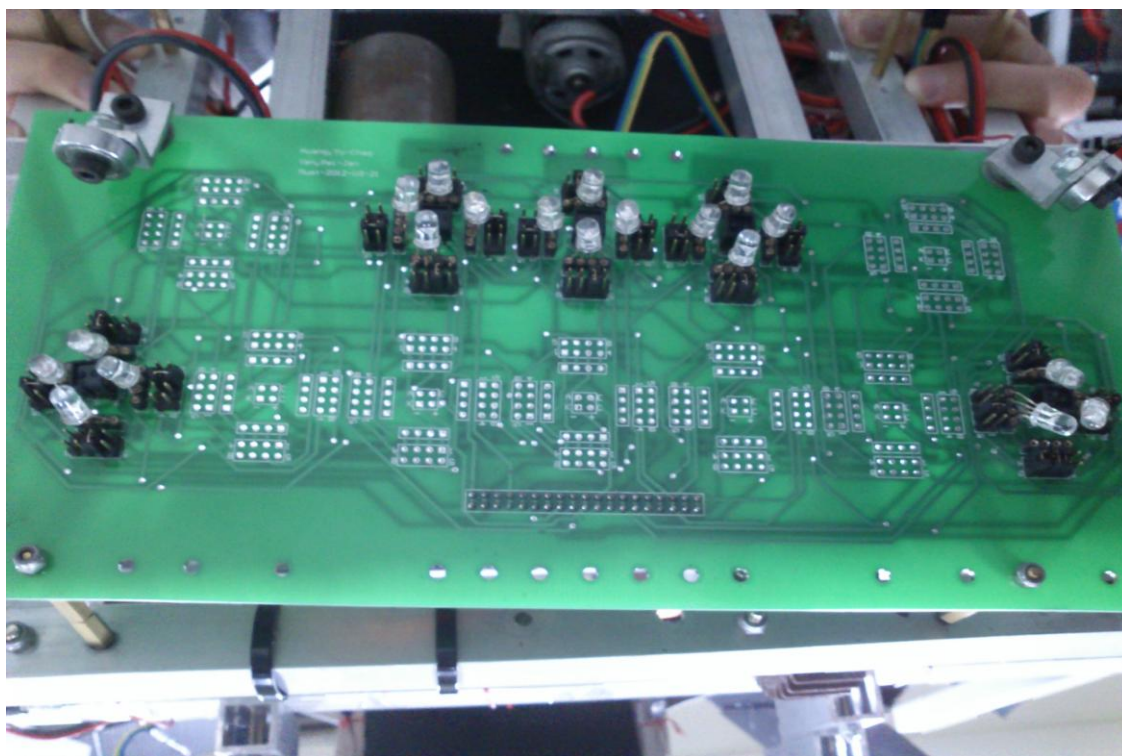


感測器調整電路板(Sensors to adjust the circuit board)



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感測電路(Sensor circuit)

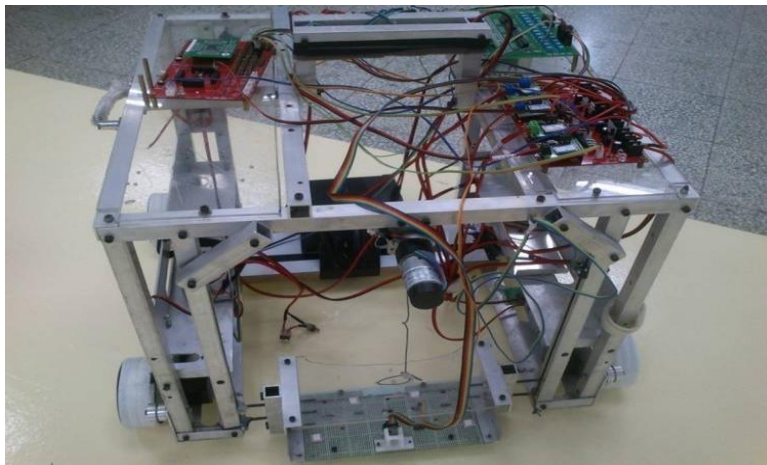
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六、組裝、測試與修改(assemble and install ,test and modify)

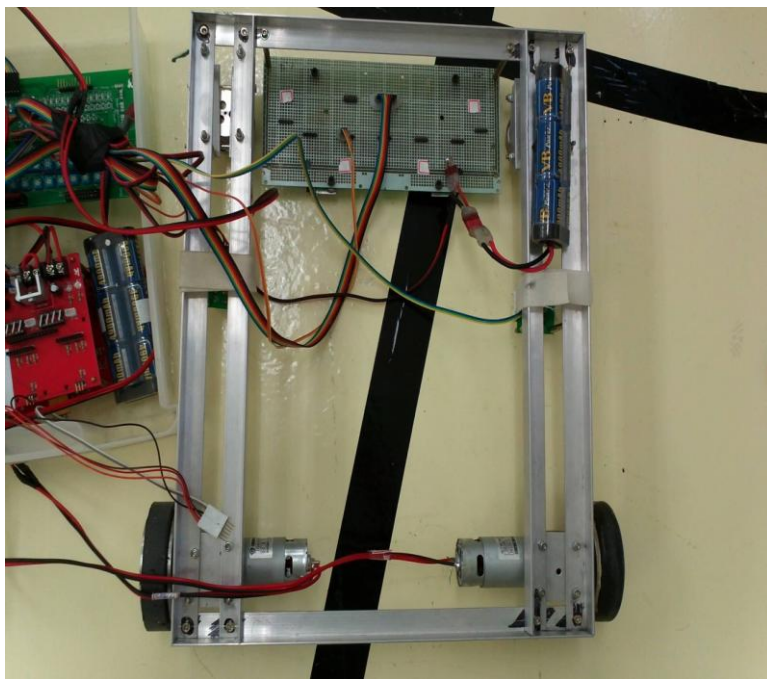
第一代的機器人我們是以四輪傳動的，後來發現磨擦力太大

First generation of robots based on four-wheel drive, but later found that the friction is too large



經過測試與修改才研發了第二代機器人二輪傳動搭配萬向輪

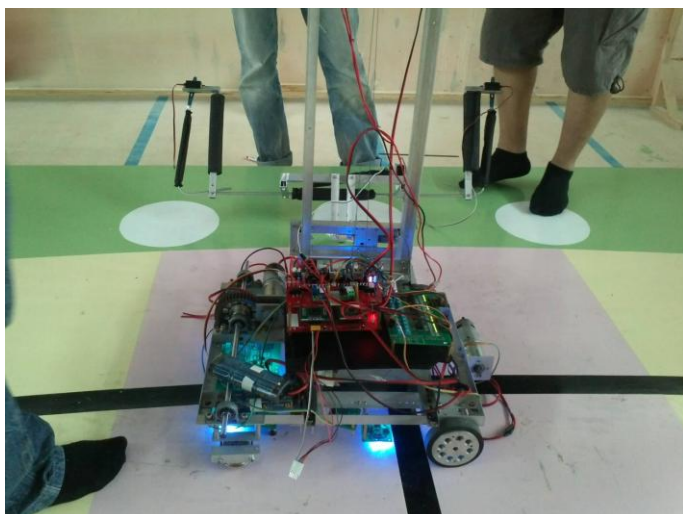
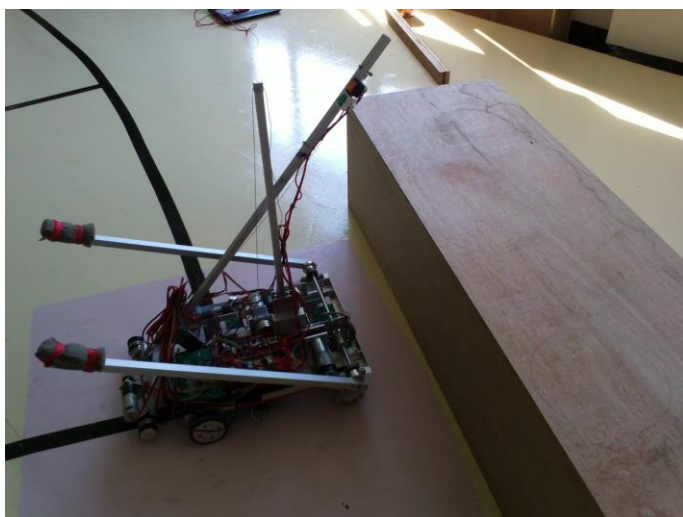
Two drive of the second-generation robot developed tested and



modified with  
castor wheels

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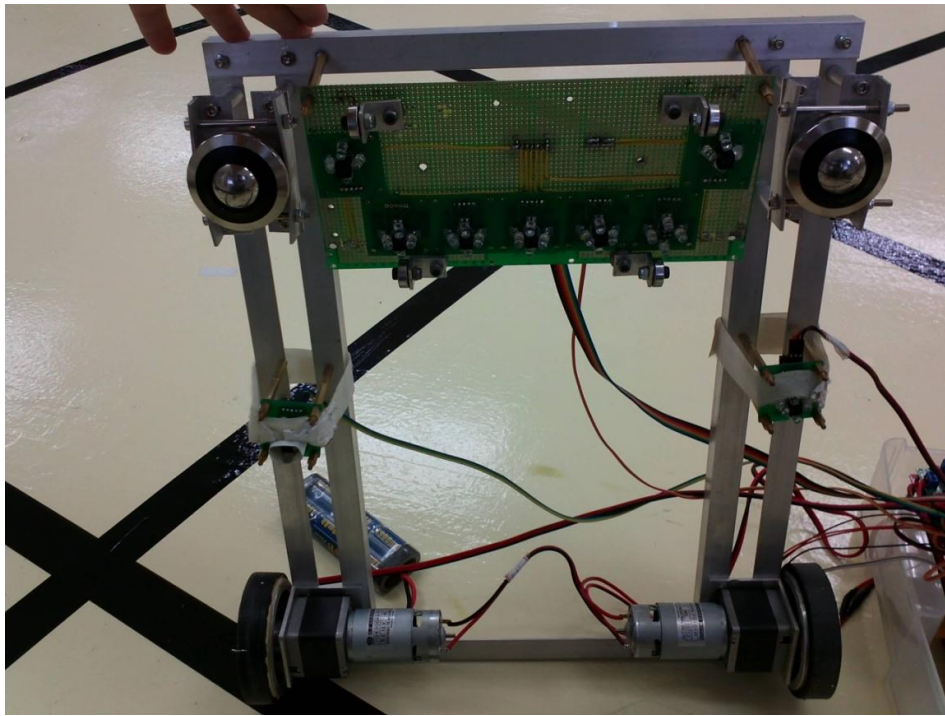


最終版(Final version)

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### 七、機器人創意特色說明(Robot creative features Description)



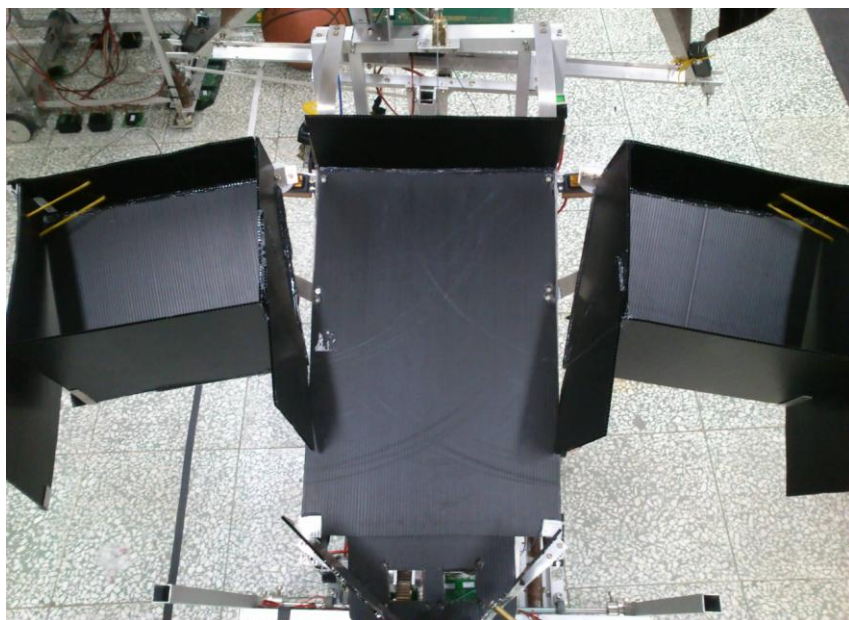
萬向輪及縮小底盤(caster wheels and mall chassis)



一次抓取三隻麒麟娃娃(Once caught three unicorn doll)

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變化性高，低成本(High variability and low cost)

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### 參、參賽心得(Competition experience)

能夠順利參加這次比賽，要感謝教育部技職司、TDK 財團法人、中州科技大學提供這麼好的比賽場地，以及明新科技大學提供比賽經費和優質的練習場地還有吳明瑞老師與學長的關心、提供意見以及經驗給我們參考。因為有這麼多人在背後默默的支持我們，我們才可以順利的準備比賽、參加比賽。

由於這次是我們第一次的參加比賽，於是我們上網查了相關資料以及觀摩、請教學長與參加了多次的研習來充實相關資訊，像是：Microchip 微控制器、TDK 研習營……..等，來增加電路、程式設計以及機器人結構製作上的觀念。

從一開始什麼都沒有到完成機構、程式一直到最後正式的比賽，這之中包含了整個團隊的努力、隊員意見不同時的爭執、製作過程失敗時的挫折感與順利完成的成就感、許多比賽的小細節等……，雖然比賽結果不如預期，重要的是過程中了解溝通、取捨的重要以及了解自己的不足要如何彌補。

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Able to successfully participate in this competition, and would like to thank the Ministry of Education, Technological and Vocational TDK Foundation, Chung Chou University of Science and Technology to provide such a good venue, and Ming University of Science and Technology provided match funding and quality driving range Dear Prof. Wu and seniors , provide advice and experience to our reference. Because there are so many people behind the scenes to support us, we can successfully prepare for the game, participate in the competition.

Since this is our first time to participate in the competition, so we surf the internet to research related information as well as to observe, ask seniors to participate in a number of study to enrich the information, such as: Microchip microcontrollers, TDK Camp .....etc., to increase the circuit, program design and structure of the robot on the concept of making.

From the outset what did not have to complete the agencies, the program has been to the last official game, among which includes the efforts of the entire team, players disagreement

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dispute, failure of the production process of the frustration with the successful completion of a sense of accomplishment, many small details of the game ...etc, Although the results of the competition is not as good as expected, it is important to understand the importance of communication and choice as well as understanding how to make up our inadequacies.