

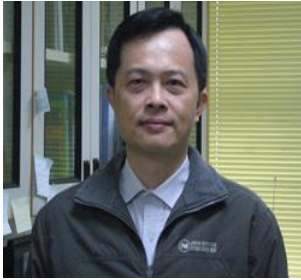
參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

組別： <input checked="" type="checkbox"/> 遙控組 <input type="checkbox"/> 自動組	指導老師：張耀仁 老師
學校名稱：長庚大學 (School : Chang Gung University)	隊伍名：CGU 聯隊 (Team name : CGU Bot)

壹、參賽隊伍人員(Each team personnel)：

一、指導老師(Instructor)



張耀仁 老師

研究領域為機電整合、智慧型控制系統、機器視覺、類神經網路。在這次比賽中，老師提供我們機構設計、得分策略和設計方向等建議，並給予我們參賽隊伍很大的支持。

Professor: Yau Ren Chang

Professor Chang's field of research is mechatronics, intelligent control system, machine vision, neural network. In this tournament, professor provided us mechanism design, score strategy and design direction, etc. And give our teams a lot of support and encouragement.

二、組員(The group members)

組長:楊子興



主要負責控制系統的設計與配置、機器人測試的部分，以及採購零件和加工零件，材料支出的紀錄與工作日誌的撰寫，並擔任機器人操控者。

Leader: Tz Shing Yang

Primarily responsible for the design and configuration of the control system, the robot test, purchase of parts, machining parts, spending records, working log writing and be the robot controller.

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組員:鄭哲瑋



主要負責機構設計、零件加工、機器人組裝的部分、協助機器人測試與零件採購。

Members: Je Wei Jeng

Primarily responsible for mechanism design, machining parts, assemble and install of the robot, assisting robot test, purchase of parts.

組員:楊恕維



主要負責機構設計、零件加工、機器人組裝的部分、協助機器人測試與零件採購。

Members: Su Wei Yang

Primarily responsible for mechanism design, machining parts, assemble and install of the robot, assisting robot test, purchase of parts.

組員:楊人豪



主要負責機構設計、零件加工、機器人組裝的部分、協助機器人測試與零件採購，與工作日誌的撰寫。

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Members: Ren Hau Yang

Primarily responsible for mechanism design, machining parts, assemble and install of the robot, assisting robot test, purchase of parts and working log writing.

組員: 鄭宇翔



主要負責電路與微控制器 Arduino 的技術支援

Members: Yu Shiang Jeng

Primarily responsible for circuit and microcontroller Arduino technical support.

貳、機器人簡介(robot profile)

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

我們的機器人以六腳為步行機構，搭配剪型升降台與強而有力電動缸，以及參考先人的智慧漁筊作為我們抓取娃娃的方式。

本次比賽中需要一個能抓取最高 2 公尺，最低低於地面 15 公分的機構。而且娃娃並沒有集中在一起，因此我們設計能快速升降的剪叉式平台。並在平台底部裝上大齒輪使平台能轉動還有電動缸作為手臂的伸縮機構，使機器人只要在定點就能完成夾取任務。在步行方面我們使用六腳機構，因為六腳機構可以每次都有三個點可以支撐本體，使本體更穩定。

Our robot is a six-foot walking mechanism, with a scissor lift with strong and powerful electric cylinder, as well as reference ancestors wisdom “Yu Quan” as our crawl institutions.

The game requires institutions which can crawl up to 2 meters, the minimum is less than 15 cm above the ground. And dolls are not together, so we designed quickly scissor lift platform. Large gear fitted in the bottom of the platform so that the platform can rotate as well as electric cylinder arm telescopic mechanism, making the robot gripping tasks can be done as long as stay at the same place. The robot walking by six feet institutions because the six feet institutions each have three

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points can support the body, make the body more stable.

二、機構設計(mechanism design)

I. 本體

使用厚 3mm 的角鋁作為本體。

Main part

3mm thick aluminum angle as the main part.

II. 步行機構

利用連軸器將馬達與軸連接，用皮帶輪將同側的腳一起帶動。

Walking Mechanism

Coupling connected to the motor and the shaft, and use pulley driven ipsilateral foot.

III. 升降與抓取機構

採取剪叉式升降平台，手臂設計使用電動缸(致動器)，並在前端加上兩根木條，吊籃採用類似原住民魚筓之結構。

Lift and crawl institutions

Take scissor lift platform, arm design using electric cylinder (actuator), plus two strips of wood in the front-end, hanging baskets similar Aboriginal fish trap structure.

IV. 旋轉平台

使用巨大的塑膠齒輪搭配小齒輪來控制轉動角度。

Rotating platform

The huge plastic gear arranged in groups with pinion to control the rotation angle.

V. 重量配置

馬達至於中央兩側，電池也在中央，使重心集中於中央。

Weight configuration

Motor As for central on both sides, the battery is also a central focus at the Central.

四、電路設計(circuit design)

本次主要選用 C++ 語言迴圈控制，透過 Arduino 晶片將所需 High 與 Low 訊號送出，以此控制馬達。

The main choice is C + + language to write loop control. The high and low signal sent through the required Arduino chip to control the motor.

五、組裝、測試與修改(assembly, test, and modify)

在腳設計部分，組裝時常會碰到的問題就是相位差的對位以及螺絲的組

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裝需要費相當的功夫。

測試時，腳行走部分常會因相位差失準而跳電或是跌倒，而在升降台部分則是螺絲鬆緊常會影響升降台穩定性，整體部分則因升降台及旋轉平台的重量使的重心不穩，為了穩定行走，機器人行走會極為緩慢。

因行走緩慢無法因應大會所規定之四分鐘，所以我們修改了程式的迴圈，讓機器人行走啟動時速度降低，等到穩定時開始加快。但最後比賽時未裝備旋轉台及升降台，主因為其為大幅提高行走時間。而在電路控制方面則是因電路不穩定，常跳電，故後來加裝高電阻。

Part of the foot design, assembly problem often encountered is the phase difference on the bit and screw assembly need to charge a considerable effort.

Test, feet walking part is often due to the inaccuracy of the phase difference tripped or fell, in part of the lifting platform the screw tightness often will affect the stability of the lifting platform, overall part due to the weight of the lifting and rotating platform so the center of gravity is not steady, stable walking robot to walk very slowly.

Walking slow and can not be in response to the General Assembly under four minutes, so we modified the program loop, so that the robot walking the startup speed reduced, began to accelerate until stability. However, the final game when not equipped with a rotary table and lifts, the main reason for its substantial increase in walking time. Circuit control is due to circuit instability, often jump electricity, therefore Later retrofitting high resistance.

六、機器人創意特色說明(robot creative features description)

CGU 聯隊主要特色在於腳部設計簡潔簡單，以少數連桿搭配兩顆馬達達成。在升降機構方面則是使用穩定性高且精準的剪叉式升降台。另外再夾取機構則使用魚筌構造，省去了使用馬達來夾取的機構及重量。

CGU wing main feature is the foot concise and simple design, reached minority rod with two motor. The lifting mechanism is high stability and precision scissor lift table. In addition, the re-gripping agencies use a fish trap structure, eliminating the need for the institutions and the weight of the motor gripping.

參、參賽心得(Competition experience)

首先我們要感謝張耀仁老師大力支持，機械工廠的技師林忠男先生，實驗室裡侯榮富學長和游源展學長以及其他許多人的幫忙，我們才能完成我們的機器人並且完成比賽。我們第一次參加 TDK 機器人比賽，過程中的

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辛苦只有實際經歷才能體會，我們投入了平日放學後的時間與暑假大部分的時間，從設計機構的腦力激盪，到尋找適當的材料，最後自己加工並且組裝與測試，過程中經歷無數挫折，但是也因為如此，我們從過程中學到許多課堂上學不到的東西或是親眼看到課本上出現的零件，了解機械業裡一些常用的單位與名詞，讓我們將理論與實務結合在一起，這是大學課程中不容易獲得的經驗，感謝大會長期以來舉辦機器人大賽，使我們在大學生活中得到了這些寶貴的經驗。

First of all, we would like to thank Yao-Jen Chang teachers strongly supported Mr. Lin Zhongnan, mechanical plant technician, laboratory Hou Rongfu the source show seniors for seniors and swim as well as many other people to help, we can complete our robot and finished the race.

The first time to participate in the the TDK robot game, only the actual experience in order to appreciate the hard work, we have invested time and summer weekdays after school most of the time from design institutions brainstorming to find appropriate materials, and finally their own processing and assembly and test process experienced many setbacks, but also because of this, we can not learn something from the process learned many classroom or saw parts of textbooks to understand the machinery industry units with nouns let's combine theory and practice, which is not easy to obtain experience in university courses, to thank the General Assembly for a long time held the robot contest, so we get valuable experience in college life.