

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

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(Team name:)

※內容需中、英對照※

壹、 參賽隊伍人員

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貳、 機器人簡介

一、 構想與策略分析

比賽的關卡有越過障礙橫木、夾取娃娃並放置在籃子裡，藉由鋼纜把娃娃運送回去，最後再把裝有娃娃的籃子抓回救援站即能達成任務，且全程必須以步行機構來移動。

Competition barriers over obstacles crossbar gripping doll and placed in a basket and transported the doll back by rope, then finally equipped with doll basket recaptured rescue station that is able to reach a task, and full walking institutions of to move.

(一)、 步行機構

Walk institutions

類型大致可分成八連桿機構、曲柄搖桿、曲柄滑塊，最後選擇曲柄滑塊，原因是製作簡單、重量輕、桿件少。

types can be broadly divided into eight-bar linkage, crank rocker, crank Slider, and finally select the crank-rocker, the reason is to produce a simple, light weight, small rod.

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

(二)、 升高機構

Higher institutions

類型大致有垂直升降機構、類吊車機構，最後選擇類吊車，原因是重量輕。

Type vertical lifting mechanism substantially class crane institutions, and finally select class crane, because of the light weight.

(三)、 夾取機構

Gripping institutions

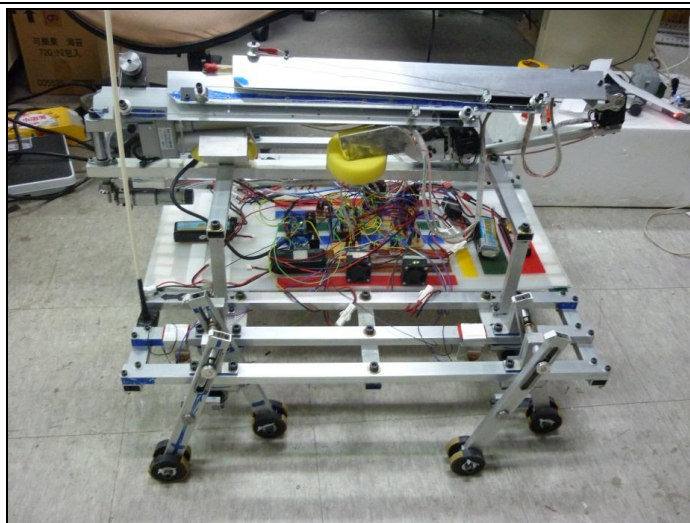
使用伺服馬達來操控手臂和夾爪。

Using servo motor to the manipulation arm and jaw.

二、 機構設計

(一)、 整體

entirety



分成步行機構和機械手臂

Divided into a walking mechanism and mechanical arm

參賽隊伍人員及機器人簡介

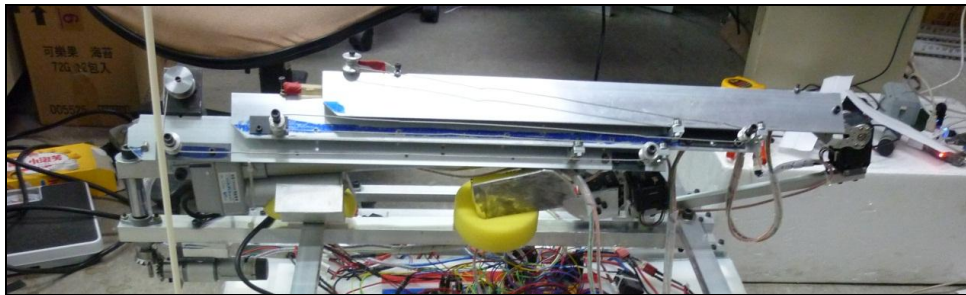
Team Member and Robot Introduction

(二)、 步行機構 Walking Mechanism



採用倒置曲柄滑塊，透過連桿的搖擺來行走
Inverted slider-crank, walking through the rod swing





(三)、 機械手臂 Mechanical arm



由類吊車結構、小手臂、旋轉機構組成
By a crane-like structure, a small arm, a rotating mechanism

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

	類吊車結構 Class crane structure		小手臂 Small arms	旋轉機構 Rotating mechanism
	電動推桿 Motorized Faders	捲線機構 Reel institutions	三顆伺服馬達 Three servo motors	馬達搭配傘齒輪 Motor with a bevel gear
功能 Function	機械手臂上升或下降 Increase or decrease of the mechanical arm	可使機械手臂伸長 Allows mechanical arm elongation	控制小手臂及夾爪 Control of small arms and jaws	使機械手臂旋轉 The mechanical arm rotation
圖 Chart				

三、輪子驅動設計

傳動是使用個別使用四顆馬達來轉動四隻腳，並使用四組 encoder 來進行負回授，確定其有正確到達位置，腳底是裝上四顆像皮輪來當腳掌。

The drive is to use individual use four motors to rotate the four legs and to use the four groups encoder negative feedback, sure it has arrived at the correct position, the soles of the feet are fitted four like leather wheel when feet.

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

四、 電路設計

(一)、 主控制器:Arduino Mega 2560
Master controller:Arduino Mega 2560

(二)、 遙控模組:Xbee
Remote control module:Xbee

	遙控 Remote control	控制 Control	
元件 Element	遙控模組 Remote control module	馬達控制器 Motor controller	伺服馬達 Servo motor
	Xbee	HB-25	Bioloid 的伺服
		LN298	馬達
		Shayangye BDC-I	Bioloid Servo motor
功能 Function	發射訊號給主控制板，再使 Arduino Mega 2560 來傳送訊 號給馬達驅控器和伺服馬達 Transmitting signals to the main control panel, and then the Arduino Mega 2560 to send signals to the motor drive controller and servo motor	控制步行機構、 旋轉機構、電動 推桿、捲線機構 Control walking mechanism, rotating mechanism, electric putter, reel institutions	控制小手臂和 夾爪 Control of small arms and jaws

參賽隊伍人員及機器人簡介

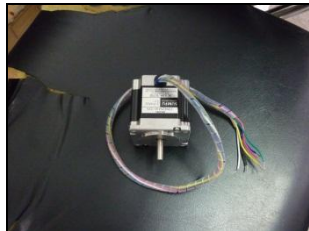
Team Member and Robot Introduction

五、組裝、測試與修改

(一)、馬達類型 motor type

由步進馬達替換為直流減速馬達，搭配 encoder 和霍爾感測器來進行 PID 控制。

Replaced by a stepper motor PID control for DC gear motor with encoder and Hall sensor.



六線二相步進馬達

Six-lane two-phase stepper motor



直流馬達(含 Encoder)

DC motor (containing Encoder)

(二)、馬達軸斷裂。 the motor shaft fracture

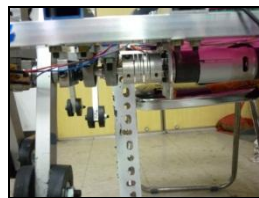
由單顆球面軸承改成雙顆軸承，且更換功率較大之馬達。

Dual bearings by single spherical bearings changed, and the replacement of the greater power of the motor.



單顆軸承

Single bearing



雙顆軸承

Dual bearings



斷裂舊馬達

Breaking the old motor



功率較高馬達

Higher power motors

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

(三)、 腳掌

the soles of the feet

將活動式腳掌改為橡皮固定式，其尚有吸震與止滑的功能。

Movable feet to the fixed rubber, there are vibration-damping and non-slip function.



活動式腳掌

Moving feet



固定式腳掌

Fixed soles

(四)、 傳動軸更換

the drive shaft replacement

軸心的材料由鋁料更換磨光圓棒加強剛性。

The axis of the material is made of aluminum material to replace the polished round bars enhance rigidity.



鋁料

Aluminum material



磨光圓棒

polished

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

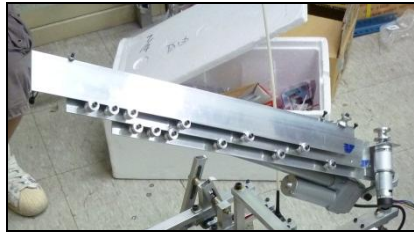
(五)、 滑槽輪更換 the chute wheel replacement

原設計之滑槽輪磨擦力過大導致零件損毀，進而改為軸承滾輪式。

The original design of the chute wheel friction force is too large to cause parts to become damaged, and then changed the bearing roller type.



左為軸承滾輪式、右為滑槽輪
Left bearing roller type, right
chute wheel



舊式滑槽輪
Old chute wheel



新式軸承滾輪
New bearing rollers

(六)、 吊臂支撐桿 the boom supporting bar

測試吊臂載重時，發現支撐桿剛性不足，由中碳鋼更換為白鐵，如右圖所示。

The test crane truck found insufficient rigidity of the support bar, and medium carbon replacement for tin, as shown on the right



左白鐵、右中碳鋼
The left tin, right in
carbon steel

(七)、 籃子的改良 the improvement of the basket

由於競賽時間有限，所以籃子的數量由雙桶改為單桶，且直徑加大。

Contest limited time, so the number of baskets by double barrel to single-barrel increase in diameter.

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

- (八)、 捲線機構的改良
reel institutions improved

增大捲線輪徑，使捲線速度上升，且增加的 PID 控制使其能保持靜止不會因為彈簧和重力關係滑動。

Increase the diameter of reel, reel speed increased, and the increase in PID control to enable them to remain stationary is not because the relationship between the spring and the gravity sliding.

六、 機器人創意特色說明

- (一)、 使用自製無線遙控器。
use the a homemade wireless remote control.
- (二)、 使用 PID 控制步行機構和吊臂旋轉的位置。
use PID control the rotation of the position of walking mechanism and boom.
- (三)、 自製四連桿夾爪，能夠確實包覆被夾物。
the self-made four-link jaws can indeed coated inclusions.
- (四)、 具有與消防車相似之外觀與音效。
has a similar look and sound and fire engines.
- (五)、 四組獨立 PID 步行機構回授控制，精準定位。
four groups of the independent PID walking institutions feedback control, precise positioning.
- (六)、 新樣式伸縮機構設計。
the new style telescopic mechanism design.

參、 參賽心得

很高興我們有這次的機會能參與第 16 屆 TDK 比賽的盛會，從製作到比賽間種種困難，以及克服困難，累積實力的過程，使之卓越成長。

比賽當天，看到各組的菁英傾囊而出，各個機器人的不同功能與訴求，這是實務上的學習，也是課堂之餘的重要課題之一。

I'm Glad we had this opportunity to participate in the 16th TDK game event, from the production to the difficulties in the game,

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

as well as to overcome the difficulties, the cumulative strength of the process, to make it superior growth.

On race day to see group elite Qingnangerchu, different functions and aspirations of each robot, which is one of the important topics of practical learning, classroom while.