

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

組別： <input type="checkbox"/> 遙控組 <input checked="" type="checkbox"/> 自動組	指導老師：詹超 助理教授
(Groups)：Automatic group	(Instructor)：Zhan super Assistant Professor
學校名稱：南榮技術學院	隊伍名：南榮特攻隊
(School)：Nan Jeon Institute of Technology	(Team name)：Nanrong commando

壹、參賽隊伍人員：

One、Each team personnel：

一、指導老師：詹超 助理教授

主要研究領域為控制理論、動態系統特性之建模與分析，以及壓電系統之應用。針對此一專題之製作，提供機構設計、控制核心的決定及系統動態特性方面之建議。以結合理論與實務，使機器人達到快速、有效率、有智慧的目標。

A、Instructor：Zhan super Assistant Professor

The area of research interests are Control Theory, Modeling and Analysis for System Dynamics, Application of Piezoelectric System. He gives valuable advising of mechanism design, the choice of control kernel and the analysis of vehicle dynamics for this project. Through the link between theoretical concepts and practical implementation, we hope our robot quickly, effectively and Intelligent.

二、組員介紹

(1)、李念祖 同學

在隊伍裡當任隊長的職務，負責領導團體、資料收集、報告製作、機體設計、零件採購、機體組裝、測試機體及碰到困難時統整構想，在製作機體完成過後，遇到要上升高 40 公分的氣壓機構出現問題，在從新討論及設計後，在氣壓缸板上在加裝一塊較長輔助板，才使氣壓上升機構能夠平穩的站立不會傾斜倒下。

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Two、Team members introduced

(1)、Lee Study Ancestor Classmate

When any captain's duties, is responsible for leading groups in the ranks, data collection, report production, body design, parts procurement, body assembly, testing body and encounter difficulties in the concept of integration, after the completion of the production of the body, when we try to rise high40 cm Pressure agency problems in the new discussion and design, the pneumatic cylinder board the installation of a long auxiliary board before the pressure rise to institutions able to smooth the stand will not tip.

(2)、林學昱 同學

在比賽中擔任操作手，負責機體設計圖、程式撰寫、零件採買、電路板製作、機體組裝及測試機體、製作一個能夠將麒麟娃娃夾住的機構，剛開始先使用小馬達機構抓到麒麟娃娃能剛好包住整個麒麟娃娃的位置，然後使用氣壓缸夾抓用氣壓夾住麒麟娃娃，以完成氣壓缸夾抓的設計。

(2)、Lin Xueyu Classmate

Game as operator, is responsible for the body design, coding, buy parts, circuit board production, body assembly and testing of the body, making a unicorn doll grip institutions, beginning to use small motor bodies caught a unicorn dollcan just wrap the the entire unicorn doll's position, and then use the the pneumatic cylinders folder grasping grip with Pressure unicorn doll, to complete the pinch-grip design of the pneumatic cylinder.

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一、構想與策略分析

構想：在設計的構想上，機器人使用氣壓缸使車子上升 40 公分，來登上 40 公分的階梯，並用 3 支氣壓缸夾抓來夾取麒麟娃娃。使用紅外線感測器來感測黑線並做尋跡，再加編碼器來算距離並且修正，再用紅外線感測器來做感測障礙物以避開障礙物的功能。

策略分析：在救災大作戰的比賽時間 4 分鐘中，先做順序如下：

- (1).先做第二關：《土石流區》，從出發區用黑線做為感測路徑到達路障區，使用紅外線感測器來通過路障區，用感測器來做避障的功能，來到救援區在夾住所有的麒麟娃娃回到救護站，以完成救援任務。
- (2).在做第一關：《山崩區》，從出發區尋跡黑線做為感測路徑，感測到障礙物(木箱)進行搬離到指定的區域放置，完成後來到救援區用氣壓缸升高 40 公分夾住所有的麒麟娃娃後回到救護站，以完成救援任務。
- (3).在做第三關：《淹水區》，從出發區尋跡黑線做為感測路徑，感測到 40 公分的階梯與斜坡障礙，使用氣壓缸升高至 40 公分再前進，前進後尋黑線通過斜坡障礙後來到救援區，用馬達螺桿使機構降下 10 公分，夾爪機構下降後夾住所有的麒麟娃娃後，再上升回到救護站，以完成救援任務。

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II、robot Profile

A、vision and strategy analysis

The idea: design concept, the robot uses pneumatic cylinder car rose 40 cm to board the 40-cm ladder with three pneumatic cylinder clip captured gripping unicorn doll. Use infrared sensors to sense the black line and do the tracing, coupled with the encoder to count the distance and correction, then the infrared sensors do sense obstacles to avoid obstacles.

Strategic Analysis: four minutes of playing time of the disaster relief operations, do first the following order:

- (1).do first second hurdle: "mudslide area from the starting area with black lines as sensing paths to reach the roadblock area, using infrared sensors through the roadblock area, obstacle avoidance and the sensors do came to the rescue zone in the grip all the unicorn doll back to the ambulance station, in order to complete the rescue mission.
- (2).doing the first hurdle: "landslide area, tracing black line from the starting area as a sensing path, sensing an obstacle (wooden box) placed to move out to the specified area to complete later to the rescue the pneumatic cylinder increases to 40 cm grip all Kirin doll back to the ambulance station, in order to complete the rescue mission.
- (3).do third: "flood zone", from the departure area tracing the black line the ladder with slopes obstacles sensed as a sensing path 40 cm, using pneumatic cylinder was increased to 40 cm and then forward find the black line after forward through the slopes obstacles later to the rescue zone, the agency lowered 10 cm motor screw, clamp clip claw institutions declined after all the unicorn doll, and then rise back to the ambulance station, in order to complete the rescue mission.

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二、機構設計

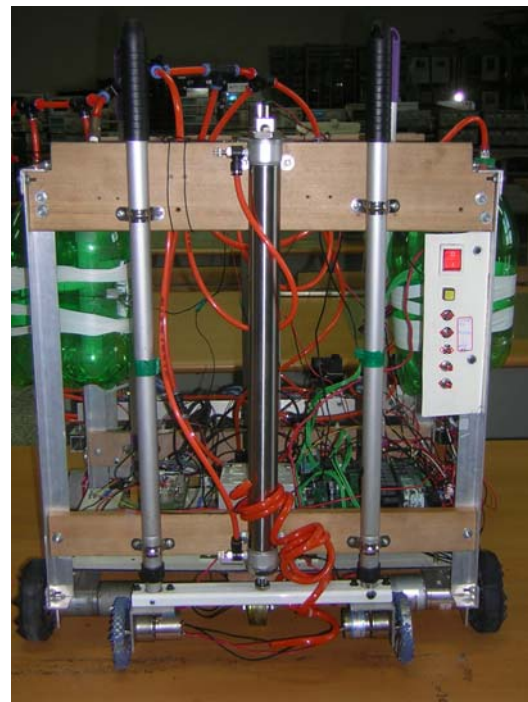
(1).馬達螺桿機構：用馬達來轉動螺桿，以達到可以帶動氣壓缸夾抓上升與下降的功能。如〈圖 1〉馬達螺桿機構之設計。

(2).氣壓上升機構：用伸長可達 40 公分的氣壓缸來做上升機構，並在氣壓缸夾抓上也使用氣壓來做為夾取麒麟娃娃的功能。如〈圖 2〉為氣壓上升機構之設計。如〈圖 2〉為氣壓上升機構之設計。

(3). 氣壓缸夾抓機構：在設計上利用 3 支氣壓缸來做抓與放的功能，在長 80 公分的角鋁的兩端上須放置 2 顆小馬達以幫助氣壓缸夾抓之轉動夾取麒麟娃娃。如〈圖 3〉為氣壓缸夾抓機構之設計。



〈圖 1〉馬達螺桿機構



〈圖 2〉氣壓上升機構

〈Map1〉Motor screw mechanism 〈Map2〉Pressure rise to agencies

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<圖 3> 氣壓缸夾抓機構

<Map 3>Pneumatic cylinder pinch-grip mechanism

Two、Mechanism Design

(1).The motor of the screw mechanism: with a motor to rotate the screw, in order to achieve the function of the rise and fall can be driven by pneumatic cylinders pinch-grip. < Map 1> motor screw mechanism design.

(2).Pressure rose institutions: with elongation of up to 40 cm pneumatic cylinder do rose institutions, and pinch-grip on the function of air pressure as the gripping unicorn doll pneumatic cylinder. < Map 2> institutions designed for the rise in atmospheric pressure. < Map 2> institutions designed for the rise in atmospheric pressure.

(3).functional The pneumatic cylinder pinch-grip mechanism: three pneumatic cylinder to do to grab and put in the design, shall be placed on both ends of the 80 cm long aluminum angle two small motors to help pinch-grip pneumatic cylinder rotating gripping unicorn doll. As< Map 3> pinch-grip design of institutions for the pneumatic cylinder.

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三、輪子驅動設計

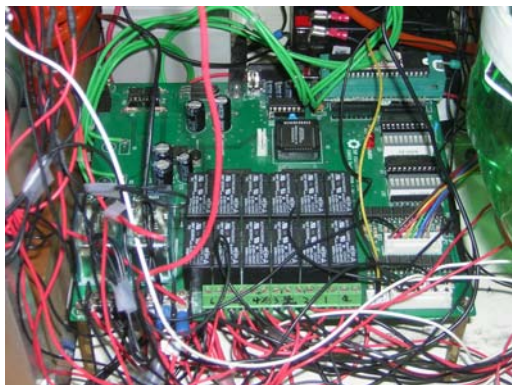
以 4 顆直流馬達來帶動 4 輪驅動，利用電壓正負極來驅動馬達正反轉，可使車子達到轉彎或後退的功能。

Three、 wheel drive design

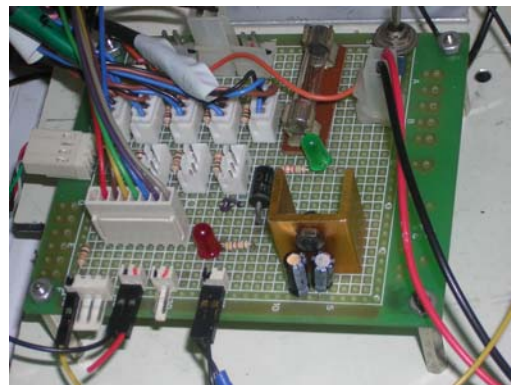
4 DC motor drive 4-wheel drive, using the voltage to drive a motor reversing positive and negative, will enable the car to reach the turn or reverse functions.

四、電路設計

在電路設計上，為了使機器能有邏輯性來判斷來進行控制，使用 8051 晶片來做為整台機器的核心，透過 I/O 控制卡來進行馬達驅動器、紅外線感測器、氣壓升降等控制，以達到比賽關卡目的之需求，在設計上為了使行走定位更精準，我們在機器人上加裝了尋跡用的紅外線感測器及編碼器等，並用數顆的感測器來進行判斷尋跡、定位、避開障礙物等的功能，以達到比賽關卡的需求及目的。如〈圖 4〉電路主板、〈圖 5〉電路板控制器。



〈圖 4〉電路主板



〈圖 5〉電路板控制器

<Map4>Circuit board <Map5>The circuit board controller

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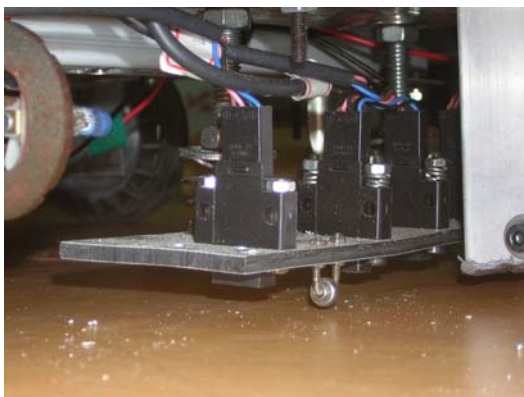
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Four、circuit design

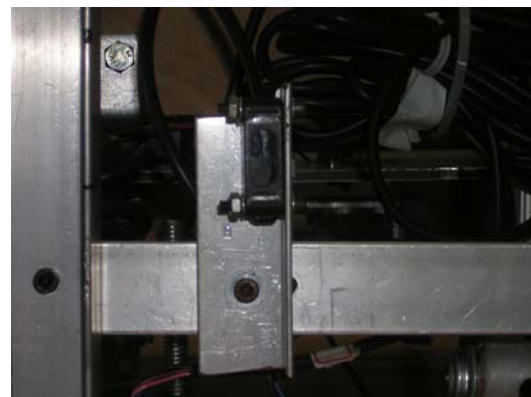
Circuit design, in order to make the machine can be logical to determine control, use the 8051 chip as the core of the whole machine, motor drive through the I / O control card, infrared sensors, pneumatic lift control in order to achieve the the race checkpoints purpose of demand, is designed to make walking more accurate positioning, we installed in the robot tracing with infrared sensors and encoders, and the number of teeth of the sensors to the judge to find track positioning avoid obstacles functions, in order to achieve the needs and purposes of the race checkpoints. < Map 4> circuit board、< Map 5> board controller.

五、感測器設計(遙控組無免填)

- (1). 黑線感測器:利用數顆紅外線感測器來感測地面上的黑線，以達到尋跡之功能。如<圖 6>所示。
- (2). 光電開關感測器:利用光電開關感測器來感測是否接近平台、障礙物、木箱等感測。利用顏色感測器來辨別顏色(紅色、綠色)。
- (3). 距離感測機構:利用紅外線感測器來感測障礙物，以測量障礙物與感測器的距離，以做閃避障礙物的功能。如<圖 7>所示。



<圖 6> 黑線感測器



<圖 7> 距離感測機構

<Map6> Black line sensor <Map7> Distance sensing mechanism

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Five 、Sensor design (remote control was no premise)

(1).black line sensors: infrared sensors to sense the the measured ground on the black line with the number of teeth, in order to achieve the tracking function. < Map 6> shown.

(2).photoelectric switch sensor: photoelectric switch sensor and proximity sensing platforms, obstacles, boxes, etc. sensing. Color sensors to do other colors (red, green).

(3).from the sensing mechanism: using infrared sensors to sense obstacles, obstacle sensors to measure the distance and to do dodge obstacles. < Map 7> shown.

六、組裝、測試與修改

組裝：

組裝機器人整體架構，機體架構採用角鋁來固定機體支架，並組裝可以上下移動的 3 支氣壓缸夾抓，並組裝 2 支可以伸長 40 公分的氣壓缸來使機器人上升 40 公分，使能登上 40 公分的階梯。

測試：

(1).氣壓缸升降機構：測試氣壓缸是否能夠上升 40 公分的階梯，在測試時發現機體會往前傾倒，必須修改。在修改上加裝了一塊輔助板，使氣壓缸升降能夠更加穩定，不會再發生傾倒的問題。

(2).氣壓缸夾抓機構：測試氣壓缸夾抓是否能夠穩定的夾住所有的麒麟娃娃，在測試時發現夾抓張開範圍不夠大，必須修改。在修改上重新製作夾抓，使張開範圍更大能夠更加準確的夾住所有的麒麟娃娃。

Six 、Assembly, test and modify

Assembly:

The assembly robot the overall architecture of the body architecture angle aluminum to fixed body bracket, three pneumatic cylinder assembly can be moved up and down and pinch-grip, and the pneumatic cylinder assembly 2 can stretch to 40 cm to the robot to rise 40 cm, enable boarded 40 cm ladder.

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Test:

(1).pneumatic cylinder lifting mechanism: testing pneumatic cylinder is able to rise 40 cm ladder, found in the test machine experience forward dumping, must be modified. Modification fitted with an auxiliary plate, the pneumatic cylinder lift can be more stable, and the problem does not happen again dumped.

(2).pneumatic cylinder clip caught institutions: testing pneumatic cylinder clip caught stable grip all the unicorn doll, pinch-grip open range is not big enough, you must modify the test. Modification re-create the pinch-grip, open wider to more accurate grip all the unicorn doll.

七、機器人創意特色說明

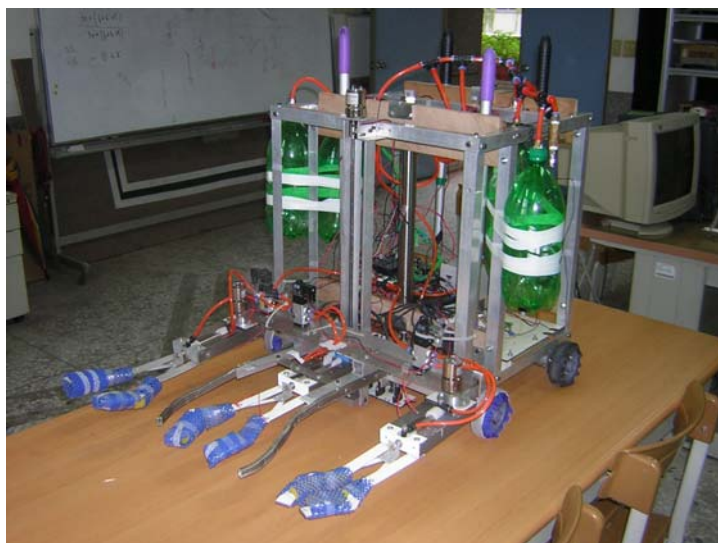
我們的機器人叫做「拯救之光」，在特色上使用大量的「氣壓」來做機構上的設計：如使用氣壓缸來上升 40 公分的階梯，並用氣壓來做夾取麒麟娃娃的動作，在機器人裝上空的寶特瓶罐，來做為氣壓的儲存罐。如〈圖 8〉所示。

Seven、Robot creative Features Description

Our robot called "Save the Light", do use a lot of "pressure" mechanism design characteristics: such as the use of a pneumatic cylinder to rise 40 cm ladder, and unicorn doll gripping action to do with air pressure in the robot installed over PET bottles, do pressure storage tanks. < Map 8> shown.

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<圖 8> 「拯救之光」之機體完成圖

<Map8> Complete diagram of the light of the "rescue" of the body

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參、參賽心得

在這次參加第 16 屆 TDK 全國大專院校創思設計與製作競賽，在參於這次的比賽過程中，從開始參加比賽到比賽結束過後，我們從過程中學習到了許多機器人的設計、製作及加工等等…，在比賽時大家都將自己製作的機器人發揮出來，我們看到了許多學校不同的設計機構及想法，這些都是我們可以去學習及參考的構想，讓機器人能夠更佳的完善，比賽結束了，大家都帶著很多不同的想法及經驗，這些都是我們在參加比賽所得到的成就，也是讓我們未來能夠更佳的努力成長茁壯。

Ginseng、Competition experience

Many robots in this time to participate in the 16th TDK National College Creativity Design and production of competitions, participate in this race, after the race from the beginning to the end of the game, we learn from the process to the design, production and processing, and so on ... in the game when everyone will produce their own robots play out, we see many different schools design institutions and ideas, we can go to the idea of learning and reference, so that the robot can better improve the gamethe end, everyone with a lot of different ideas and experience, these are our achievements in the contest, is to make our future efforts to better grow.