

參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

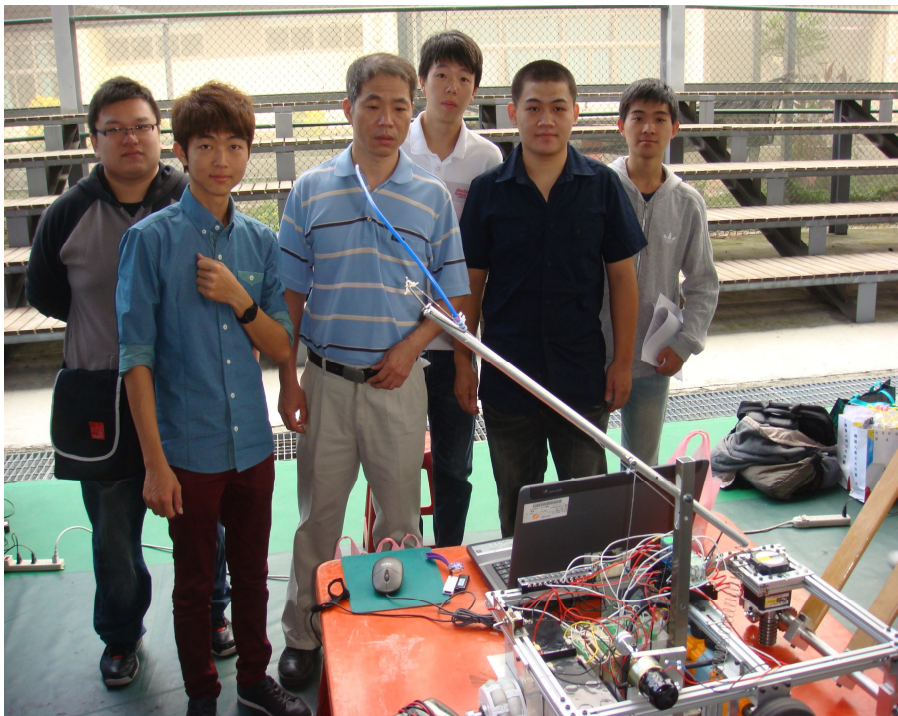
組別：遙控組 自動組 指導老師：沈明河
學校名稱：南開科技大學 隊伍名：救難先鋒一隊
(School :) Nan Kai University of Technology (Team name :) Rescue Pioneer No. 1

壹、參賽隊伍人員：

一、指導老師：沈明河 (Advisor : Ming-Ho Shen)

二、組員：陳衍汎、廖晉德、李昱緯、陳威仁

(Team member :Yen-Fan Chen, jin De lio, Tu-Wei Li, Wei-Ren Chen)



圖(一)

貳、機器人簡介(Introduction)

一、構想與策略分析(Idea and strategy analysis)

簡單輕巧與快速是我們的設計策略。

Simpleness, lightweight and quickness are our design strategies.

二、機構設計(Design of the mechanism)

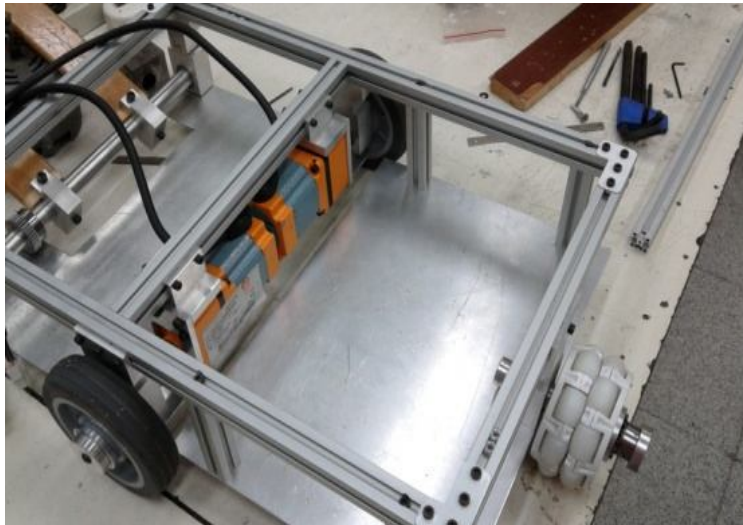
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1. 車體設計：(Chassis)

我們的車體是以長方體的架構來設計的，此種設計除了可以方便擺放各種機構與電路外也可增加車身的穩定性與強度，如圖(二)。

A rectangular structure is used to design as the chassis. This design can easily place the electric circuit and increase the stability and strength (Fig.2).



圖(二)

2. 堆高機構：(Lifting mechanism)

我們使用蝸桿與蝸輪作為我們舉物機構，使用蝸桿齒輪可大幅增加減速比，可產生較大扭矩以提起重物。如圖(三)。

We use the worm and the worm wheel as the lifting mechanism. It can produce greater torque for lifting obstacles (Fig. 3).



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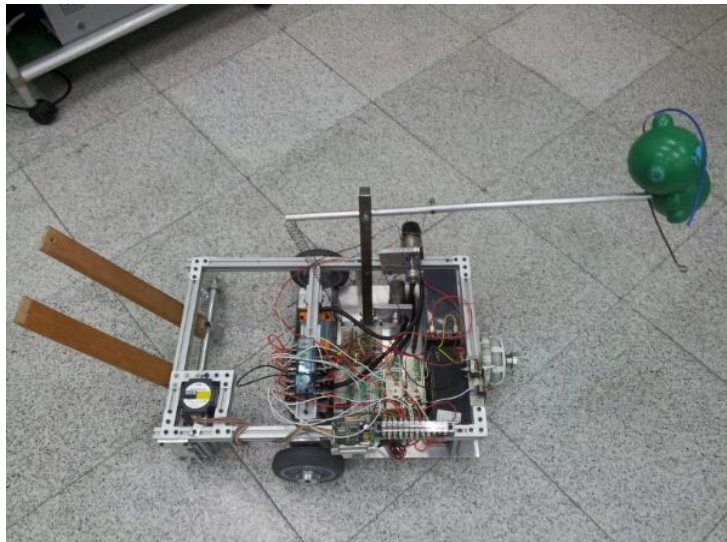
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圖(三)

3. 取物機構：：(Gripping mechanism)

以一彈性管環繞娃娃，由馬達帶動彈性管之鬆緊，完成取放娃娃(圖四)。

An elastic tube driven by the motor is surrounded by a doll. By controlling the tightness of the elastic tube, one can complete the pick-and-place of doll (Fig. 4).



圖(四)

三、輪子驅動設計(Design of the driving wheel)

因需較大摩擦力及機動性高，故使用橡皮輪作為主動輪，萬向輪則裝配在車身後方，主要用於支撐車身用及改變方向時可減少摩擦力，輪胎驅動則使用直流無刷馬達來帶動輪子轉動。

Needing more friction and mobility, the rubber wheels are used as the driving wheels. A caster is mounted on the rear of the body to reduce friction when the scar is changing direction.

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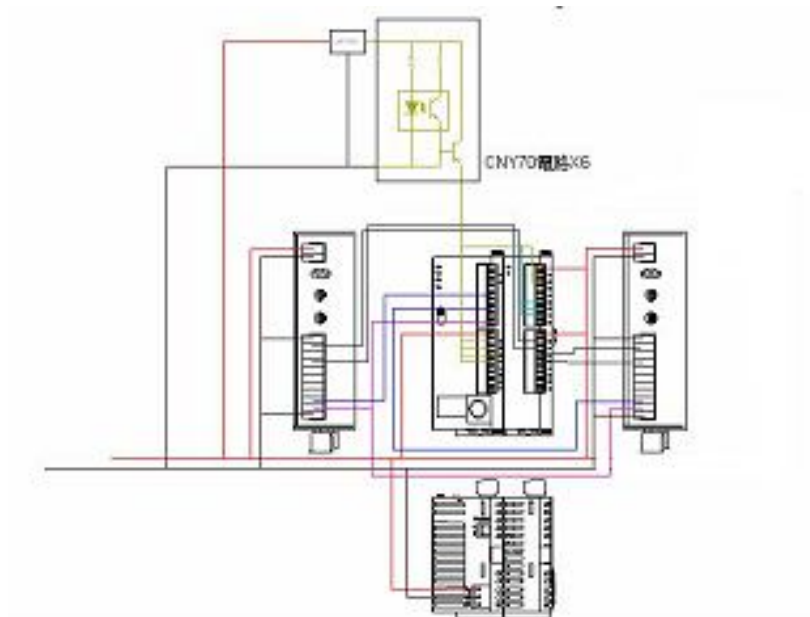
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The wheels are driven by two brushless DC motors.

四、電路設計(Design of the electric circuit)

機器人是以前PLC作為主要控制的核心並且用來控制輪胎的作動方向。本設計中主要是用感測器來感測並且將訊息回饋至PLC中後運用程式加以控制，此回饋系統使機器人能穩定地在場上行走。如圖五所示。

A PLC controller is used as the control unit of our robot. The signals detected by sensors are returned to the PLC for judge to form a feedback system. This system helps the robot to walk smoothly in the court. (Fig.5)



圖(五)

五、感測器設計(Design of the sensor)

六顆 CNY70 讓機台穩定的在黑線上行走，紅外線感測器來感測娃娃的位置。

Six CNY70 sensors are used to detect the guide line and the

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photoelectric sensor are used to detect the doll.

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

持續測試與修改提供一具穩定可靠之機器人

Continuing test and modification provide a stable and reliable robot.

七、機器人創意特色說明(Robot Characteristics)

1. 以結構簡單而輕巧為原則，機器人以兩顆直流馬達及PLC控制器加以控制。

Under the design concept of simplicity, the robot is driven by two DC motors and controlled by a PLC controller.

2. 車身設計成長方形較為瘦小，能通過障礙區。

The chassis is designed as a rectangular structure. The thinner chassis is easier to pass obstacle area.

3. 蝸桿與蝸輪作為我們舉物機的機構，使用蝸桿齒輪可大幅增加減速比，可產生較大扭矩以提起重物。

The worm and worm wheel are used as the lifting machine. It can produce greater torque for lifting obstacles.

4. 感測器設計在主動輪的馬達附近，由於前面有置物板能夠遮掉大部分的光線，才能使感測器不受到外界光的影響。

The sensor is placed in the vicinity of the driven wheels. The parcel shelf blocking out most of the light, it reduces the influence of the external light.

參、參賽心得 (Competition experience)

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在設計與製作過程中，常常遇到困難，過程非常辛苦，但每個成員都能盡自己最大的努力為整個團隊的成果貢獻。當問題解決的那一刻，那種快樂的感覺是無法形容的。為參加這次比賽讓我們獲得很大的收穫，我們學習到中尋找各式各樣新的資訊，並不斷分析討論與請教學長們的經驗。參與此專題製作在未來的學業或事業上，都是難得的寶貴經驗。

During the design and manufacture, we frequently encountered the difficulty and felt extremely laborious. But each team member can do their best for the results of the whole team. Once the problems were overcome, our happiness was inexpressible. Participating in this competition let us get a great harvest. We have learned how to search new information, discuss with other members and ask the experience of seniors. The participation of doing this project is a valuable experience for future studies or career.