參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

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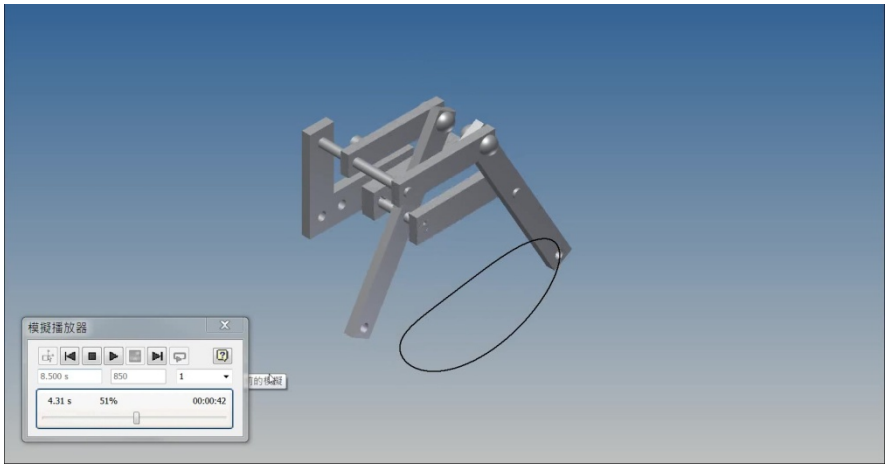
貳、機器人簡介

壹、　構想與策略分析

一、　構想：

以最常見的馬達驅動，使轉動變成前進運動來作步行機構的構想。(如圖一)

The most common motor drives the rotating into forward motion as the concept of the walking mechanism.



（圖一，黑色線為運動軌跡）

二、　策略分析：

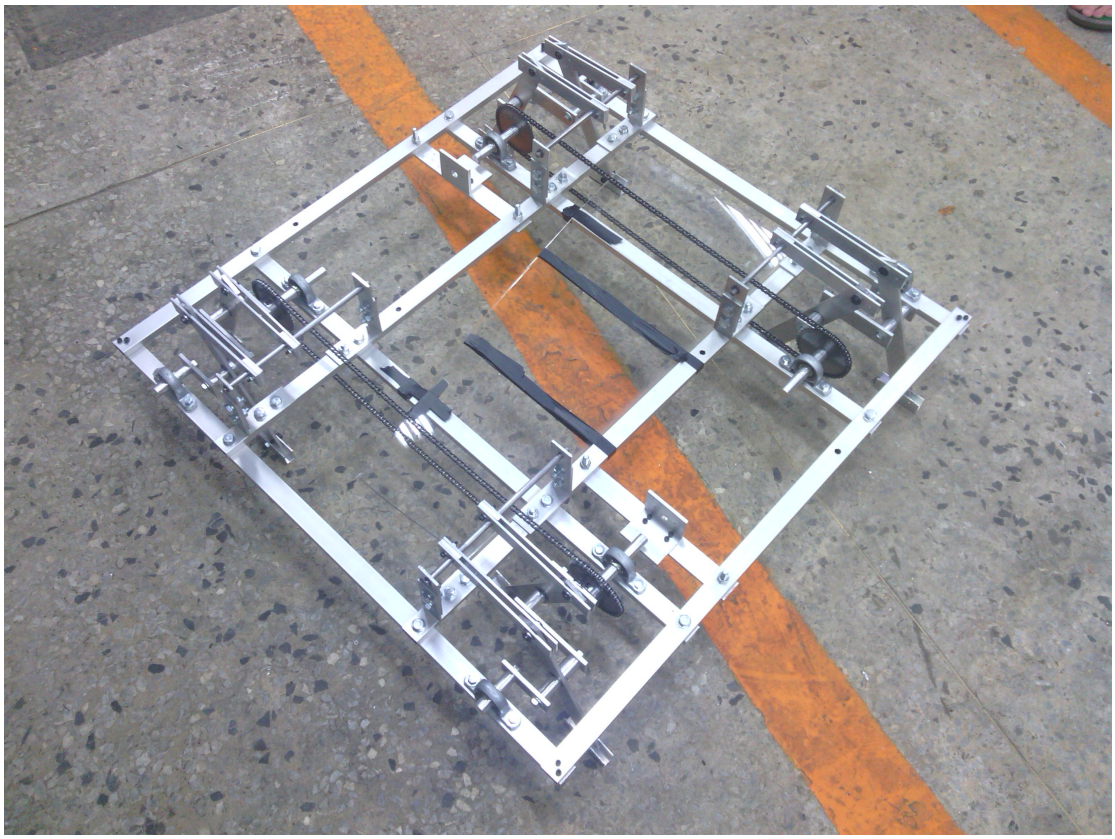
將運動軌跡的加速度，速度以及位置由電腦分析出各點的數值計算出由靜止變為前進時的最大抗力，以及所需之馬達的扭力，希望能夠讓機械人能在短時間內達到比賽要求。

The motion trajectory acceleration, velocity and position by computer analysis of the numerical calculation of each point forward from rest to the maximum resistance, and the required motor torque, want to be able to make the mechanical competition requirements in the short time to achieve.

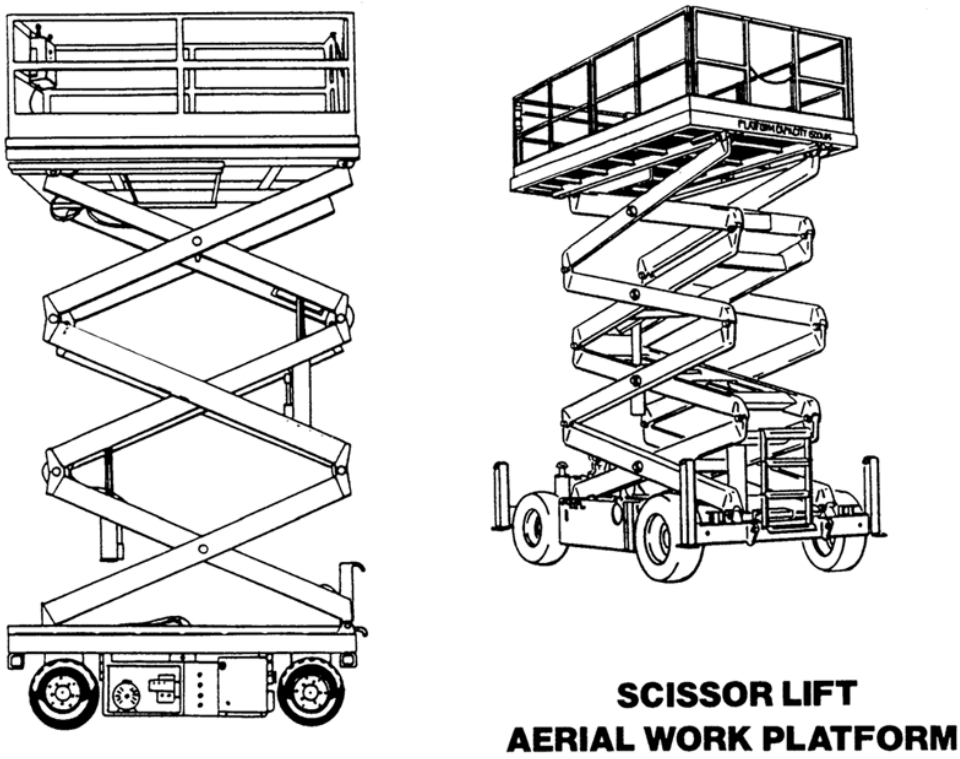
貳、 機構設計

圖一的構想為基礎，將它變成四邊各有一組，靜止時為八根件在地面保持平穩，欲動作時由四根桿件撐起，另四根桿件離地達到移動的效果(如圖二)；手部機構升高採用 Scissor Lift 架構達到升高目的，Scissor Lift 常用於起重機或者是高空作業的平台架高。(如圖三)

(Figure 1)The idea is based on it into the four sides have a group, rest for eight remained stable on the ground, propped up by four rods For action, another four rods from mobile to achieve results (Figure 2); hands institutions rise Scissor Lift framework to achieve a higher purpose, Scissor Lift commonly used in cranes or aerial work platform frame high.



（圖二）



（圖三）

參、 步行驅動設計

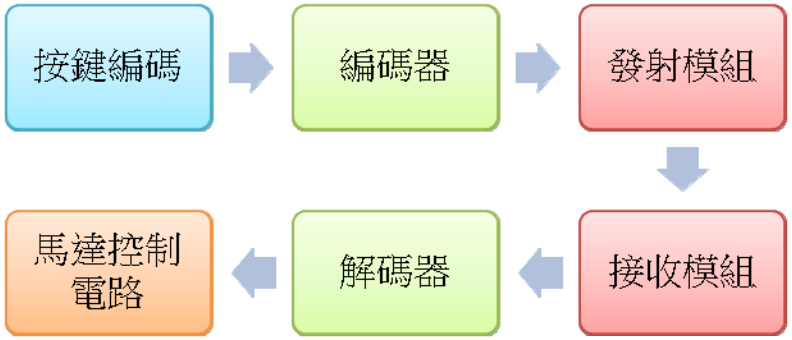
依圖四來說明驅動設計，由馬達左右各一顆帶動各邊的機構，以鏈輪達到單邊前後腳同動的目的，若是要轉彎可採原地旋轉或者差速旋轉，原地旋轉為左右兩邊轉向不同，差速旋轉位左右兩邊轉速不同。

To illustrate driven design in accordance with (Figure 4) about each one by a motor driven each side of the agency, the purpose of the unilateral front and back foot with moving the sprocket reach, if you want to turn mineable in situ rotation or differential rotation, spin around for left and right turn around both sides of the speed differential rotation bit different.

肆、 電路設計

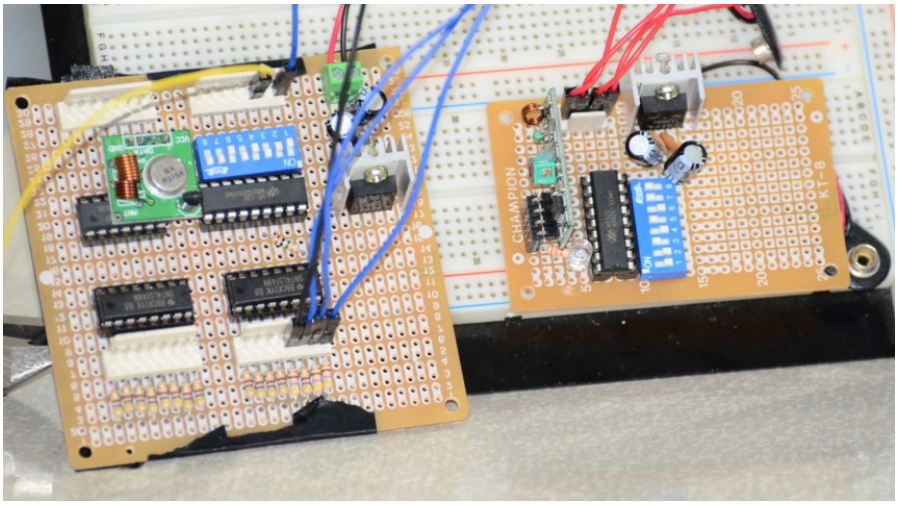
由下列流程來設計電路。

The circuit is designed by the following process.



（在馬達控制電路部分採用 arduino MEGA 的控制板作控制）

（上圖為 arduino MEGA 控制板的圖片）

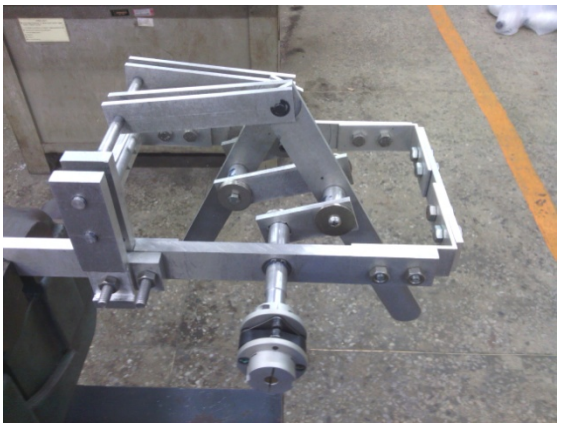


（上圖為自製無線電路收發模組）

伍、 組裝、測試與修改

在組裝及加工時遇到重重問題，如配合件加工不易、鑽孔孔距誤差、配合件加工時間太長、組裝困難等等，經歷過第一板本的加工及組裝(如圖四)，上圖二為第二版本。

Encounter many problems in the assembling and processing, such as with the parts processing difficult drilling Pitch error, fittings processing time is too long, difficult to assemble, and experienced the first on board processing and assembly (Figure 4),the (figure 2) for the second version.

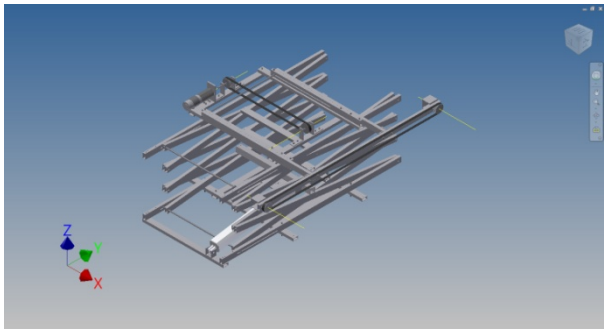


（圖四）

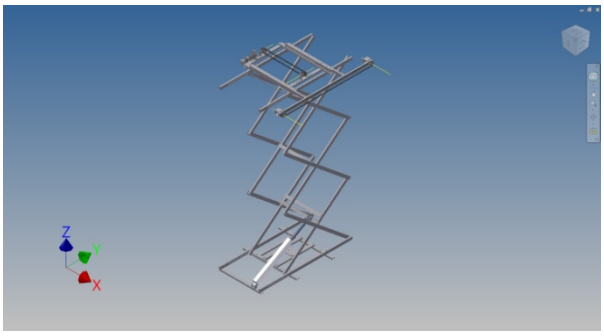
陸、 機器人創意特色說明

採曲柄搖桿機構作為步行機構的基礎，手部機構升高採用 Scissor Lift 架構達到升高目的，Scissor Lift 常用於起重機或者是高空作業的平台架高。
(如圖七，圖八)

Mining crank-rocker mechanism as the basis of the walking mechanism, hand institutions rise the Scissor Lift framework to achieve rise purpose, Scissor Lift commonly used in cranes or aerial work platform elevated.
(Figure 7, Figure 8)



（圖七）



（圖八，此圖為升高狀態可達 1.8 米）

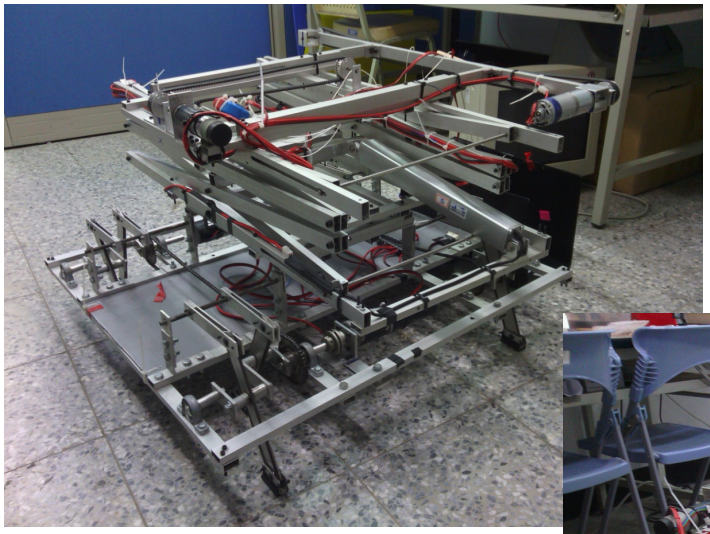
柒、 討論

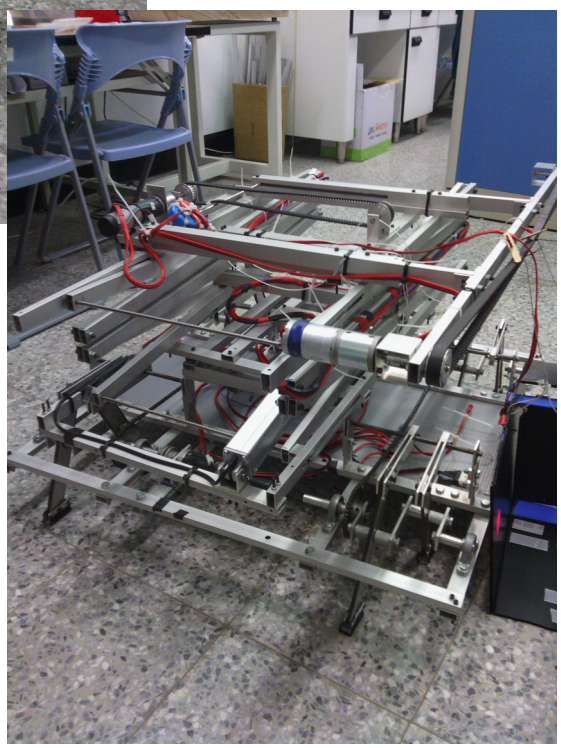
步行機構的部分，也曾考慮過用四顆馬達提高扭力，可是這會使得左右兩邊的前後腳同動的作動有所誤差，所以才採用原來鏈輪的方式來使前後同動降低程式撰寫的困難度；手部機構升高採用 Scissor Lift 試過多種的方法最終使用電動推桿，使用電動推桿原因是由於機構要升高需要較大的推力但使用導螺桿速度又不夠，所以為了解決速度問題又不能犧牲推力，採用電動推桿來完成，電動推桿推力有 80kg 速度卻有 17mm/s，升到最高不用 10 秒的時間就可以完成，但因為推桿推力太過於強勁把機構推到損壞(如圖九)，之後在改變此材料的大小跟固定方式就沒有損壞的問題。

Part of the walk institutions, have also considered the four motors improve torque, but this will make the same move left and right sides of the front and rear legs for moving some errors, so only the original sprocket front and rear with the move to reduce programming difficulties the degree; hands institutions rise Scissor Lift tried a variety of end-use electric putter, putter reason is the use of electric requires greater thrust due to the agency to be rise but using a lead screw speed is not enough, so in order to solve the speed problem and not at the expense of thrust, Motorized Faders Motorized Faders thrust 80kg speed there 17mm / s, rise to the highest not 10 seconds can be completed, but because the putter thrust too strong to institutions pushed to damage(Figure 9), and after changing the size of this material there is no damage to the problem with the fixed manner.

（圖九）

捌、 實物照片





整體機器人

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貳、 參賽心得

第 16 屆 TDK 盃全國大專院校創思設計與製作競賽，第一次參加 TDK 競賽，在製作此題目時機構設計一開始時沒有任何概念與創意，於是開始收集資料包括歷屆比賽報告書、歷屆影片以及外國的相關的比賽影片、報告書、論文等等才開始有概念，也逐漸設計出機構，但發現到有加工上的困難處，逐步改進之後才慢慢有了成品，作業期間使用軟體模擬幫助設計，像是路徑軌跡、應力分析、安全系數等等，省下不少材料費，作出成品再驗證過後與模擬結果一致性高，才慢慢體會到就算上了大學學到的知識一時之間要用卻又覺得難以結合，這應該只有競賽才可以學到的知識跟經驗，當然也包括團隊合作規畫的理念。

TDK Cup 16th National College Creativity Design Contest, the first time to participate in TDK contest, making this topic agencies do not have any concept of creative design beginning, began to collect data including the previous match report, previous game video of the movie as well as foreign, report, papers, and so began the concept also gradually devised institutions, but to processing difficulties at gradually improved after slowly with the finished job during use software simulation to help design, like a path trajectory, stress analysis, the safety factor, etc., to save a lot of cost of materials to make finished after the re-validation and consistency of simulation results slowly realized even if the university learned knowledge moment between use but find it difficult to combine, this should only competition can only be learned knowledge with experience, of course, including the concept of teamwork planning.