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

一、構想與策略分析

1.構想：

我們在構想機器人整體時，分為兩個部分，分別是腳部和手部機構，腳部機構我們參考荷蘭動能藝術家 Theo Jansen 示範他所創造的機能動物圖，以風力為動能，骨架由電動導管組成，在沒有人力控製的情況下，會自己走動，遇到海水就倒退，就像真的擁有生命一樣，Jansen 將這些動物放在荷蘭的海邊，任"牠們"自由來去，但是我們設計的機器人無法讓他由風力驅動，所以我們改而用馬達驅動，手部則要戲分三個小細節，籃子、手臂、抓取裝置，這三個部分因為腳部重量的原因，所以我們使用就簡便的東西作為設計考量，分別運用生活隨手可得的東西加以改造。

2.策略分析：

1. 腳部

(1) 行走

A. 橫桿

B. 上下坡

腳的部分基本上是整場比賽最為重要的地方，經過我們分析過後，設計各桿件的長度讓他可以跨越五公分的橫木，上下坡的部分，我們有在網路上找影片，網路上的影片不能保證能否上下坡，但可以確定的事，他比蜘蛛型的更穩定更容易行走過上下坡。

2. 手部

(1) 抓取

A. 高

B. 中

C. 低

抓取分為三個部分，因為機器人高度大約會落在一公尺左右的高度，對於抓取最低娃娃的難度十分巨大，加上一個籃子最多只能放置六支娃娃，所以我們把重心全部放在叫好抓取的六個娃娃上，希望能達到最佳效益。

(2) 放置

A. 娃娃

B. 纜繩

纜繩高約兩公尺要放置十分不簡單，容易產生搖晃，我們採取十字向上的方法來增加穩定度，娃娃因為只打算抓取六支故只設計一個籃子。

1. Idea

We in the idea of the whole robot, is divided into two parts, namely, foot and hand institutions, steps institutions we reference kinetic energy Theo Jansen artist demonstration he created the function of animal diagram to wind for kinetic energy, skeleton by electric catheter composition, in the absence of human control, will walk, meet the water turns retrograde, like really have life, Jansen will these animals in the sea of the Netherlands, as "they" free come and go, but we design of robot can't let him drive by the wind, so we change and with motor drive, the hand should play three small details, basket, arm, gripping device, the three partly because the weight of the foot reason, so we use simple things as a design considerations, respectively using life handy thing to transform.

2.the strategy analysis:

1.foot

(1) walking

A. crossbar

B. on the downhill

Part of the foot is basically the most important place in the whole game. We designed the length of the rod so that it can across the than five centimeters crossbar after us analysis. On the downhill part, we were looking for videos on the network. The movie cannot guarantee whether on the downhill, but something that can be determined, he is more stable than the spider type easier line came on the downhill.

2 hands

(1) crawl

A. High

B. medium

C. Low

Crawl divided into three parts because the robot approximately fall height of about one meter height. It is huge difficulty crawl the lowest doll, and a basket can only be placed up to six dolls. So we put all the focus applauded crawl six dolls. we are hoping to achieve the best efficiency.

二、機構設計

仿生獸的機構是由 11 連桿而組成的複雜機構，九由帶動一個傳動軸，來驅動其他連桿的運動，在運轉時最下方的機構會有台生的現象，經過計算，配合聯桿長度要達到五公分以上的高度是很有可能的，因為連桿眾多，相對其他部分也重，故重心也會往下偏移。抓取裝置採用類似百貨公司旋轉門的方式一次抓取三隻娃娃，手筆長度配合機器人的長寬高加以計算，使用類似沖床機構的方式以達伸縮效果，掛取娃娃得裝置，，用 6 個 30CM 十字連桿相互交叉向上，夾角大約是 60 度大約可伸長 150CM，達到掛取目的。

Second、mechanism design

Theo Jansen's mechanism of institutions is a complex organization composed of 11 link. It is driven by a drive shaft to drive the other rod movement. In the lowest part of the body will uplift phenomenon operation has been calculated, with the length of the link to reach the height of more than five centimeters is likely because many rod relative to other parts of the weight, so the center of gravity will be offset down. The grasping device similar to department stores' revolving door grab three dolls in the once time. The length and breadth of the robot arm's length with calculated, using a similar punch agencies to achieve a telescopic effect. Hanging to take the doll was the device, with six30CM cross rod intersect upward angle of about 60 degrees extensible approximately 150CM, to hang fetch purpose.

三、輪子驅動設計

傳動軸是一條水平線 ，由兩點構成一條線 ，所以我們在這邊採用兩個連座軸承去支撐他　而且這樣並不會影響到他的轉動，再傳動軸的末端是連接著帶動整個腳步機構作動的一個連桿，藉此帶動整台機器人運動。

Third、Walking design

The transmission shaft is horizontal line and it connected on two bearing. This wouldn't affect its rotation. The end of the transmission connected with our robot connecting rod which is linking with robot's leg. By this way our robot walks.

四、電路設計

我們腳步是分左右兩邊，這是為了讓機器人能夠轉彎所作的一個設計，只要我們停止一邊轉動，另一邊轉動，就能達到轉彎的目的，所以我們這邊採用三切開關，利用這個開關我可以分別控制左邊或是右邊的馬達正反轉。

手部機構外接一個馬達並靠著他的旋轉力，驅動整隻手臂旋轉，並以扣壓的方式抓取。

我們使用了一個小型的馬達，來做我們升降平台的動力來源，靠著我們的機構，我們把旋轉的力，改為上升的力量。

最後升降平台、手部機構、足部的馬達，分別接上一個三切開關並使他們並連在電池上。我們再把開關集中，成為我們的控制盒線路。

Fourth、Electrics circuit design

We used two motors to control our robot walking. If we want to turn left or right, we open one of motor and close the other. To do this, we use the switch which can control motor positive rotation, negative rotation and holding.

And our grabbing design has another motor which use its power to rotate robot's arm. This would make our robot grabbing like NBA player bank shot.

In our elevator, we use a motor to its power. By design we turn motor rotation to rise or drop.

We use four motors to make our robot moving. Each of motors is parallel another and linking with switch. And all of them link with the battery which is in the back of the robot. Finally we collect all of switch in the box. This is what we deign.

五、組裝、測試與修改

組裝大約可分為兩次，地一次組裝時，身體採用焊接的方式構成，因為焊接的點眾多，造成桿件有些許變形彎取，在軸承的使用上也以一個為主，導致連接馬達的軸容易產生變形，以致腳部的走動上產生困難，經過多次測試後，我們決定重新組裝身體的零件，以兩個軸承來固定馬達的傳動軸，依近日測試的結果，機器人可以穩定的行走，但在行軸的過程中，桿件與桿件相互之間還是有些許的碰撞，這部份是我們還須測試各種不同的桿件長度，來慢慢地修改。

手的部分組裝十分簡單，比較困難的地方是手臂的長度十分難以預估，我們計畫申請去場地測試後再依機器人的實際狀況加以調整，其他的部分則是固定在平台上為主。

Fifth、Assembly, test and modify

There are about two times to build up our robot. At the first time, we used welding to combine our body of robot. However, there are some deformations on our rods because of too many welding points. In addition, we only used a bearing to fixed our axis, and that cause our axis connected to the motor deforming easily. Finally ,our feet of robot couldn't move because of these questions. Then, we found that it's not enough to use only a bearing to fix our axis. We used two indeed. After we test, the robot can walk stably. Besides, there are some friction between rods. In the part, we should take more tests about different rods and modified them.

The hand part which we build up is very simple except the long of arm which is difficult to estimate. We decided to make adjustment after site investigation.

六、機器人創意特色說明

要設計可以行走的機器人十分困難，我們想到用網路上的資源來當靈感，整體腳步設計十分壯觀，於是尋找到彷生獸的機構因為機構十分複雜，所以對於設計的精度上要求十分嚴苛，在製作時為了調整精度花費相當的時間，整體看來腳步機構十分的帥氣。

整體外觀並沒有什麼特別的地方，基本上大小還是以正立方體為基準，跟一般不太一樣的地方，是我們在設計上捨棄掉了身體這一部份，馬達直接安裝在腳部的中間，在傳動和重心配置有正面的影響，比較擔心的事，前後兩個裝取會對機器人的穩定度造成影響。

Sith、The feature of our robot

It's very difficult to design a robot walked. We thought of using the resources on the network as the inspiration. The overall pace of the design was very spectacular, and we decided to use the design-- Theo Jansen institutions. Because the institutions are very complex, the design accuracy requirements are very stringent , and the design cost amount of time. Fortunately , our institutions seems very successful.

The appearance is nothing special. The body is basically on the shape of the cube . The different is that, in the design, we discard the body part with the motor installed directly in the middle of the foot. It could make benefit on transmission and

center of gravity on the stability of the robot. However , it should be noted that the two devices will impact the degree of stability of the robot.

參、參賽心得

機器人比想像中的難要駕馭許多，比賽的地板十分的光華，和我們自己假想的地板相差甚遠，但這不是去比賽拿步道優異分數的藉口，去了 TDK 的參賽會場，真的被震懾到了，瞭解什麼叫人外有人天外有天，基本上 TDK 這項比賽是以科技大學的學生為主所舉辦的活動，科大學生們為了這項比賽真的是使出了渾身解數，各種努力的心血結晶暴露在會場上，能進八強的都被科大生所佔據了。機器人光在會場上真的感覺就輸了一半了，大部分科大學生的機器人都十分的短小精幹，而我們的都是以 25KG 極限在製造的，感覺得出來他們所受到的學校重視度真的不是我們國立大學學生所能想像的。

Robot imagined difficult to drive a lot of, the floor of the game very smooth, and our imaginary floor vary greatly, but this is not to play with trails excellent score excuse, Went to the TDK participating conference site TDK The competition is based on the main activities organized by the students of the University of Science and Technology what good robot, Science and Technology college students for the game are employed full, Various kind of achievements present diligently in conference site can enter the final are college Science and Technology students. Robots in the meeting to feel lost, most Science and Technology students robot are very precise, and we are all 25KG extreme manufacturing, feel they are school importance was not our national university students can imagine.

機器人成品

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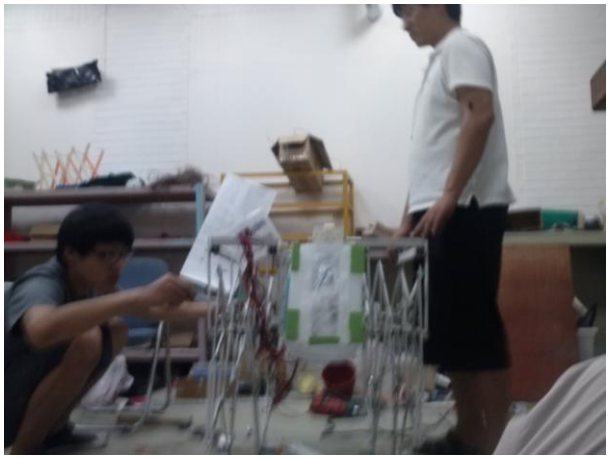

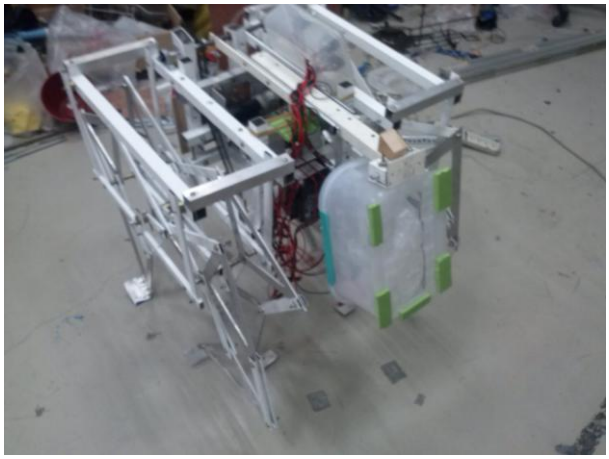

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