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：許兆民 助理教授
學校名稱：國立高雄應用科技大學	隊伍名：高應 JWCS
(School：National Kaohsiung University of Applied Sciences)	(Team name：KUAS_JWCS)

壹、參賽隊伍人員：

Race Team And Staff

一、指導老師：許兆民 助理教授

Advisor：Chao-Ming Hsu Assistant Professor

主要研究領域為有限元素、光學分析、光電與半導體封裝等。針對此機器人之製作，提供機構設計、控制核心及機電整合等方面的建議及指導。將理論與實務結合，使機器人達到創新、快速、靈巧、簡易、決策之設計目的。

The main research areas are finite element, optical analysis, photoelectric and semiconductor package, etc. For the production of the robot, he provides the suggestion and guidance for the mechanism design, control kernel and the combination of mechanism and circuits. Combination of theory and practice, so that the robot can achieve innovation, fast, smart, simple, decision-making of design purpose.

二、組員

Group Member

1. 李依珣

負責程式設計、小組之工作協調、馬達控制程式設計、感測器程式設計，路徑規劃、輔助機構設計、輔助機構加工、單晶片與感測器的溝通、資料之彙整等。

Yi-Syun Li

Responsible for program design, group's work coordination, motor control programming, sensor programming, path planning, auxiliary mechanism design, assisted machining, single-chip sensor communication, data compiled, etc.

2. 吳國瑋

負責機構設計、以 solid work 繪製零件與組合件之圖檔、機構配置、機構除錯處理、改良機構樣式、機構加工、材料採購、輔助電路配置、小組討論紀錄、小組攝影等。

Guo-Wei Wu

Responsible for the mechanism design, draw parts and assembly of solid work, mechanism configuration, the debug machinery, improved mechanism style, machining, material procurement, auxiliary circuit configurations, panel discussion record, group photography, etc.

3. 廖建森

負責電路設計、電子零件採購、輔助機構加工、馬達驅動電路及感測器電路等相關電路的設計與實現、配置感測器，路徑規劃及現場比賽之操作等。

Jian-San Liao

Responsible for the design and implementation of the relevant circuit of the motor drive circuit and sensor circuit, circuit design, procurement of electronic components, auxiliary institutions processing configuration sensors, path planning and operation of the live game, etc.

貳、機器人簡介

Robot Brief Introduction

一、構想與策略分析

Vision And Strategy Analysis

本機器人之機體設計理念，乃建立於車體的輕巧、耐撞且易更換零組件為前提下來製作。在此理念下，我們大部分使用 L 型鋁條來製作車體，而感測器的周圍則使用鋁條來加以保護，以避免與對方相撞時，導致感測器的損壞。而在車體的銜接處，則使用 L 型鋁條來相互接合，以避免車體作動或碰撞時，導致機構與機構之間的脫落。同時，在車體組裝前，也考慮到在比賽時，一方面以方便放置電路板，另一方面能以最快的方式來更換零組件為前提而施工。對主題與場地規劃作徹底了解，並針對各關卡進行實測，以進行時間較短者為優先順序。

The robot body design philosophy is built on a lightweight body, crashworthiness and easy replacement of components produced down the premise. In this concept, we use the L-shaped aluminum bar to make the car body sensors around the use of aluminum bars to be protected in order to avoid colliding with each other, resulting in damage to the sensor. At the convergence of the vehicle body, the use of L-type aluminum strips to mutual engagement, in order to avoid the vehicle body for moving or collision, resulting in the shedding between the bodies and the mechanism. In the same time, before the chassis assembly, taking into account in the game , on the one hand, the premise convenient place the board, on the other hand can be the fastest way to replace the components and construction. Conduct a thorough understanding of the theme and venue planning, and measured for each checkpoint time shorter priority.

二、機構設計

Mechanism Design

本體機構以長方形機構為底盤，機構前方結合搬運落石、夾娃娃與分類機構，以鋼索、捲線器及雙向滑軌相互配合控制機構之升降及左右移動，再利用左右旋的螺桿控制夾爪縮放，以達到雙動救援娃娃之動作。機構後方以齒輪及齒條方式抬升搭配前方機構下壓，兩機構相互配合以達到上階梯之動作。

The ontology mechanism rectangle for the chassis, mechanism in front combined with handling rockfall, folders doll bodies and classification, cable reel and two-way rail complement each other to the controlled entities lift and move around, re-use the left and right rotation screw control jaws scaling, in order to achieve the double-action relief doll of action. The mechanism behind the rack and pinion uplift with the front of the mechanism press down, the two agencies cooperate with each other in order to achieve the action on the ladder.

三、輪子驅動設計

Wheel Drive Design

底盤部份以堅硬度較高之鋁材做定型，具有不易變形損壞及穩定的平穩度，裝取電路容易、更換電池快速等特性，以四輪驅動方式由直流馬達驅動主動輪，機器人行進中以左右輪差速方式微調轉正，路口判斷後，以左右輪反向方式控制機器人左右轉。上階梯時，抬升機構後以後輪驅動支撐前進，升起後輪後再以前輪驅動前進。

Chassis part to the higher stiffness of aluminum do stereotypes, not easy to deformation damage and stable flatness, easy insertion or circuit, replace the battery rapid driven by a DC motor driving wheel, four-wheel drive, the robot moving to adjust left and right wheel differential positive judgment of the intersection, the left and right wheels reverse way control robot left turn. On the ladder, lifting, rear-wheel drive, support forward, raised rear wheel, front-wheel drive forward.

四、電路設計

Circuit Design

將所需之電路全部洗成電路板，先是運用 MULTISIM 將電路圖畫好，將其轉出，並規畫零件位置和設計電路，最後再將其印出，經過曝光、顯影及蝕刻完成電路板，再將電路板鑽孔，焊上所需之零件，在依程式設計搭配使用，溝通各功能之電路板。

All of the required circuit board, the first use of MULTISIM draw circuit diagrams, turn out and planning parts location and design of circuits, printed Finally, after the completion of the exposure, developing and etching circuit boards, and then drilling circuit boards, welding on the required parts, in accordance with the programming with the use of the communication function of the circuit board.

五、感測器設計

Sensor Design

本機器人之控制核心為單晶片 AT89S52，控制系統則採用反射型光感測器感測且搭配單晶片來組合操控。反射型光感測器用來感測軌跡且傳送感測訊號至單晶片來加以處理，單晶片則藉由接收到的資料來判斷機體所在的位置，同時下達決策去控制機器人行走的方向，並以裝置在車體各部位的接觸開關判斷後續動作。使用多個接觸式開關進行位置確認，判斷接下來之動作。使用顏色感測器判斷起始之隊伍顏色，並搭配紅外線感測器判斷娃娃位置及放置區。

The core of the control of the robot as a single-chip AT89S52, control system using the sensor with a single chip to combine manipulation. Sensor for sensing trajectory and carrier sensing signals to single-chip to be addressed, single-chip, by the information received to determine the position of the body, at the same time issued a decision to control the direction of the walking robot to the device in the car body the various parts of the contact switch to determine the subsequent operation. The use of a plurality of touch switches for position confirmation, it is determined next operated. Judge the team colors, starting with a color sensor with infrared sensors to judge the dolls position and place the area.

六、組裝、測試與修改

Assembly, Test And Modify

以 solid work 繪製零件與組合件之圖檔後，整合所需之材料並採購，依其設計圖個別加工並組裝，將機構各部分手動測試後，修正各部位之問題並討論改版設計，再以 solid work 重新修改繪製新版機構，並繼續測試修改。

Draw parts and assembly of solid work, the integration of the necessary materials and procurement, according to their the design individual processing and assembly, the agency manual testing and correction of various parts of the problem and to discuss the revised design, re-modify draw new version institutions and continue to test modifications.

七、機器人創意特色說明

Description Of The Robot's Creativity Features

本機器人之載具驅動係以直流馬達作為動力輸出，底盤部分採用四輪驅動，以此四輪之底盤作為本機器人之行走部。車體的設計主要參酌堆高機、砂石車為主要雛型，再依比賽規則要求加以修改而成。主要是設計與研製具上階

梯、避障、搬運與夾取物品功能之機器人，此機器人以車型機器人為主，其包含了車體架構、傳動控制以及感測器，無須操控，完全依靠感測器及單晶片控制，利用反射型光感測器擷取地面導引線，依據感測結果驅動機器人左、右輪的直流馬達，使車輪能前進、右轉、左轉，平順的沿著軌道行走。其具備紅外線感測以及辨識顏色等系統，機構設計上必須是可以上階梯、避障、搬運物體，以及可以夾取物品之機構。

The robot vehicle drive system as the power output of a DC motor, chassis part of the four-wheel drive, order four of the chassis as the robot walking. Bodywork mainly referred to the Stacker, gravel trucks prototype, and then request to be modified in accordance with the rules of the game is made. Designed and developed with ladder, obstacle avoidance, handling and gripping objects function of the robot, this robot models robot-based, including body structure, drive control and sensor, without manipulation, totally dependent on the sensor and single-chip control, use of sensors to capture ground guides, according to the results of sensing drive the robot left and right wheel, so that wheels can move forward, turn right, turn left, walk along the track smoothly. With infrared sensing and identification color system, the institutional design must be on the ladder, obstacle avoidance, handling objects, as well as the institution of the items can be gripping.

參、參賽心得

Race Experiences

在製作機器人設計與加工的這段時間，我們碰到許多的難題，也曾盲目地徘徊於困境之中，這要感謝老師的指導，讓我們學習到如何突破這困境並解決問題，雖然在過程中會有很多次的失敗以及挫折，但是這種挫折感也是在我們製作過程中最大的動力來源，因此在逆境中克服困難的精神以及隊友的鼓勵和支持下，才有現今的成果和收穫。對我們而言，比賽雖已結束，但從中所學習到的知識與經驗，讓我們體認到人生競賽的價值，是在成與敗中學習成長，未來又將是一連串新的考驗的開始！

Making robot design and processing, we encounter many problems, have blindly wandering in trouble, thanks to the guidance of a teacher, so we can learn how to break through this dilemma and solve the problem, although in the process there are many failures and setbacks, but this frustration is the largest in our production process momentum source, in the face of adversity to overcome the difficulties of mental and teammates encourage and support, have today's achievements and harvesting. For us, the game came to an end, but from the knowledge and experience in learning to let us recognize the value of life contest successes and failures to learn and grow, and the next turn is the beginning of a series of new test!