第 19 屆 TDK 盃全國大專院校創思設計與製作競賽

機器人特色簡介

填寫日期: 2015/10/30

基本資料

組別：自動組
學校名稱： 國立臺灣大學
指導老師： 林沛群
隊伍名： CASUS
參賽人員：黃珮瑄、何欣容、吳宗澤、王霆皓

機器人特色簡介

天鵝一向具備純潔、優雅、從容、自信的特色。同時，在中國文化中，天鵝名鵠，天鵝代表我們的鴻鵠大志。我們取之作為機器人的形象。

人的手臂是具有許多運動自由度跟感測器的精巧設計，可以完成許多複雜、精巧的動作。本次比賽的許多關卡涉及較精密的定位，例如寫字跟拿球，因此在設計機器人上，我們採用六個自由度的仿生手臂，搭配特製夾爪的方式，以達成夾球與夾筆的任務。同時，手臂伸展優雅，仿若天鵝之脖頸。而場地都為平地，為移動平穩且省能，移動平台採取輪型底座，利用雙輪差速控制。輪型移動平台平穩，如同天鵝氣質優雅滑過場地。一般的顏色感測器僅能知道自身位置（也就是感測器當下偵測到的顏色）。若想要讓機器人跑快一點，就需要向前方看，也就是預測未來的位置。為了達到這個目的，使用微抬傾角

的相機擷取較遠方地面的影像，並以之進行影像處理以循線。微抬傾角的相機架亦仿若天鵝引頸向前的樣子。但這個方法的缺點是無法知道現在位置，所以必須加入超聲波感測器協助定位。

The features of swans are pureness, elegance, calm, and confidence. Meanwhile, in Chinese culture, swans mean the big aspiration. So we pick swan as the figure of our robot.

Human arms are delicate designs which have many degree of freedom and have many sensors. Therefore, they can complete many complex actions. In this competition, writing and taking the ball, which involve precise works, are main goals. Therefore, we use a bionical-arm of six degree of freedom with a gripping jaw to hold the pen and the ball. Meanwhile, bionical-arm stretches elegantly, just like the neck of swan. Moreover, the ground in this competition is flat. In order to make the movement steady and to save energy, we use wheels as our base, and control by the differential of two wheels. It looks like a swan swims through the ground gracefully. Common color sensors can only detect where they are. If we want to make our robot go faster, we need to make it look forward, that is, to forecast the position of future. We use an inclined camera to get image of further ground. By image processing, whose images can be used to follow the line. But the disadvantage of this method is that the position of the moment is unknown. Therefore, the ultrasonic sensor is needed for location.

Fig.1. 創思機器人 --- 正視圖。

圖片說明: 在前方採雙輪控制方向。 相機固定在正中間，以方便進行地面黑線擷取。超聲波感測器亦裝設在中間，用以偵測與白板間的距離。相機上的毛除了裝飾外，亦可防止球掉落。

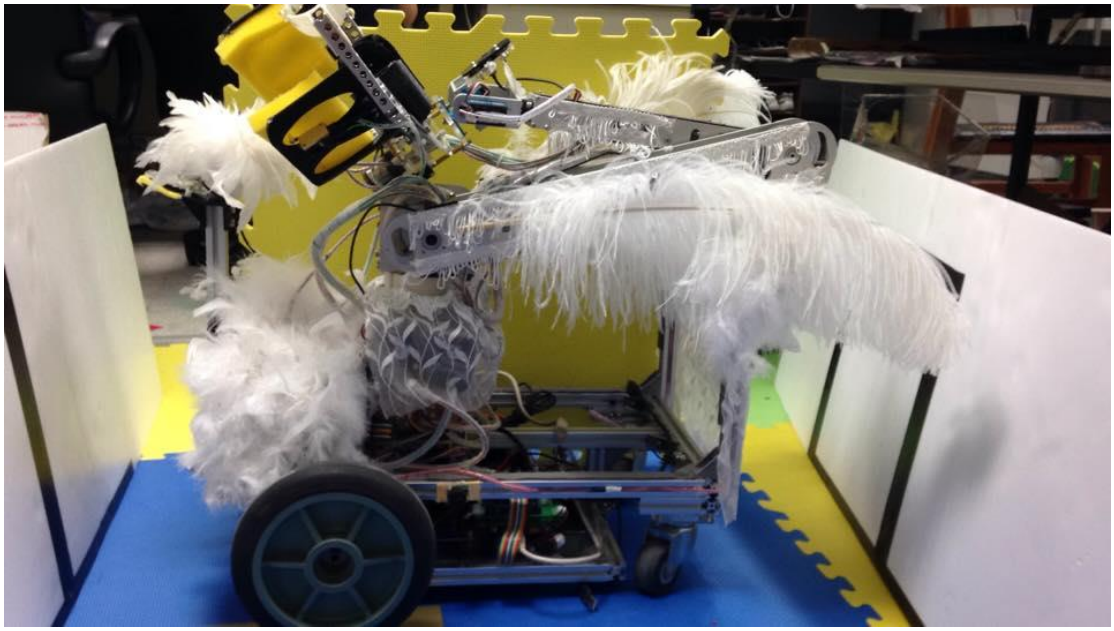
Explanation: Use two wheels to control the direction. The camera fixes in the middle in order to get the image. Ultrasonic sensor also fixes in the middle, to detect the distance between our robot and the white board. The furs on the camera not only use for decoration but also prevent the ball from falling.

Fig.2. 創思機器人 --- 後視圖。

圖片說明: 後方輪子為被動惰輪，用來維持平衡。

Explanation: Two idler wheels keep the robot’ s balance.

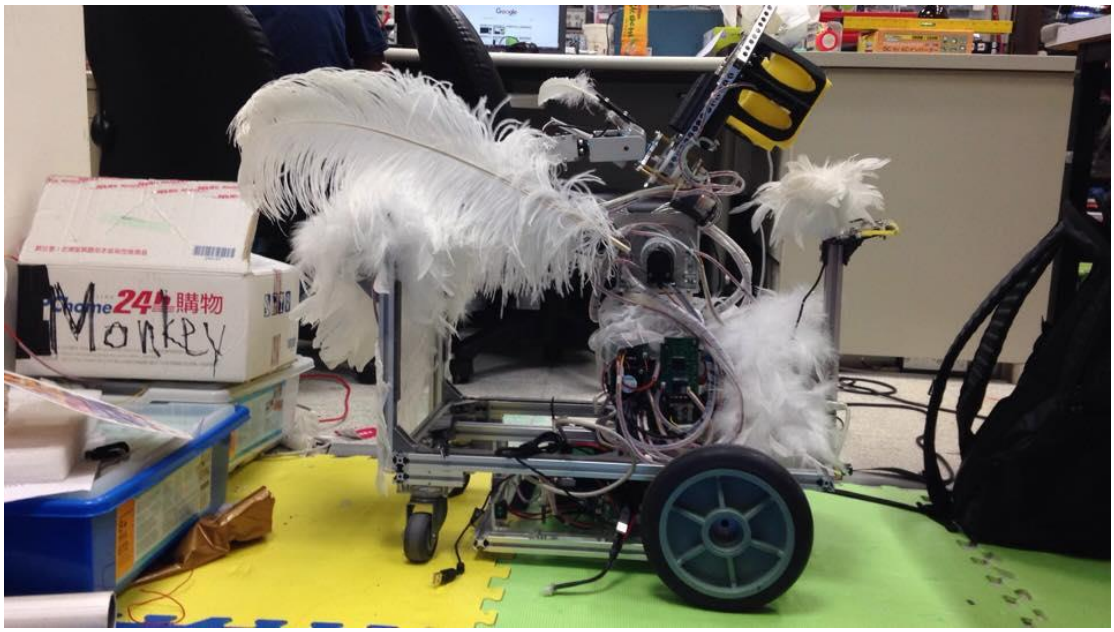
Fig.3. 創思機器人 --- 右側視圖。



圖片說明: 手臂繪製好工程圖後，送件加工，採用 7075 鋁板。車體後方的鋁擠用來防止筆電掉落，以及支撐休息時的手臂。羽毛用來裝飾，當手臂舉起後，羽毛會像天鵝展翅。

Explanation: The bionical-arm made by aluminum. The shelf at the end of the robot prevent the laptop from dropping and support the arm. Furs are decorations. When the arm raise, furs look like the wings of swan.

Fig.4. 創思機器人 --- 左側視圖。



圖片說明: 車身採取鋁擠型組成，剛性佳。利用前方的羽毛擋住控制板。為了防止羽毛捲入風扇中，利用紗狀布料擋在前方。

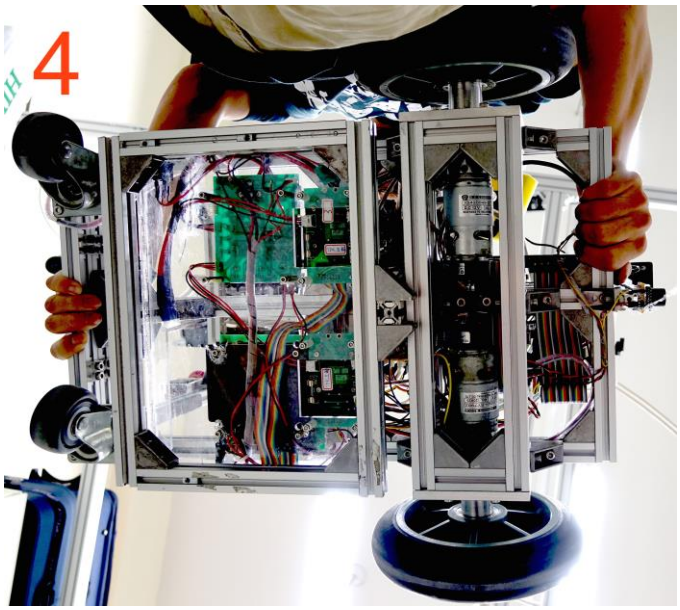
Explanation:The base is made from aluminum. Furs can hide the board. Gauze prevents fans from furs.

Fig.5. 創思機器人 --- 俯視圖

圖片說明: 手臂第三軸利用皮帶傳遞馬達的力，末三軸則是伺服馬達。辨色用的相機裝在伺服馬達架上。

Explanation:The belt converts the force produced by the third joint. Last three joint on the bionical-arm move by servos. The camera for detecting color is lying on the shelf of servos.

Fig.6. 創思機器人 --- 底視圖。



圖片說明: 底座利用鋁擠額外裝了一個平台，用來放置電池以及固定 sbRIO。

Explanation: A platform for battery and sbRIO is set by aluminum under the base.

Fig. 7. 創思機器人 --- 特色圖。

(請放置一張組員與機器人之合照，可以充分表達出機器人的特色。)

圖片說明：這張圖是我們與機器人的合照。與人比對後可以發現，我們機器人體積小。

Explanation: We and our robot , Little Swan, was taken in this photo. It is clear that this robot is quite small by comparing with humans.