Application AB-034

作品名稱

具視覺可移動式之投球機器手臂

A Vision-based Mobile Pitching Robot Arm

隊伍名稱

黃金手臂 Golden Arm

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作品摘要

本作品主要利用壓克力板設計機構並配合數個AI-1001伺服馬達建構一個仿造人的手臂的投射系統，再用Borland C++ Builder的軟體所撰寫控制指令，透過串列埠傳輸至每一顆AI伺服馬達上，來控制機器手臂的運動。為了讓機器手臂具有視覺，進而像一般的投手一樣，因此加上了視訊攝影機，將影像資料擷取到電腦上，進行影像處理並加以分析後，得到我們想要的資訊後，進而下達指令控制機器手臂，使其更具有智慧並更精確有效的將球投向目標物。為了讓機器手臂更加的靈活，將機器手臂裝在自走車上，使其可自行移動與瞄準。目前系統的測試功能包括靜態與動態實驗。靜態目標為縮小版的九宮格。動態目標為浮球，浮球是利用吹風機將保麗龍球吹向半空中，將吹風機固定在遙控自走車上，其利用8051及RF模組所組成，便可控制浮球的位置。

Abstract

This work mainly investigates the construction and control of a robot arm, powered by several AI-1001 servomotors, in order to mimic a human arm's motion. The robot arm is controlled via Borland C++ Builder codes, which are transmitted by RS232 to each AI motor. In order for the robot arm to have the vision capability, like a human pitcher, a CCD webcam is added to capture target image. After image processing and analysis, controller can compute and then issue the motion commands to the robot arm. The vision system helps promote system's intelligence and improves pitching precision. Furthermore, placing the robot arm onto an autonomous vehicle increases its mobility. Two experiments are performed to demonstrate its ability. The static target is 9 prearranged rectangles. The dynamic target is an air-floating ball, which is kept in midair using a blower. The blower is fixed on a remote-controlled car, consisting of AT89S51 and RF, and can control the ball trajectory.