

Ball and Plate System

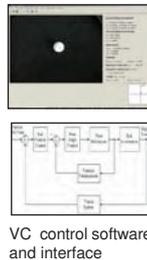
Patent in process

Overview

The ball and plate system is a multi-variables, non-linear control target, which is the 2D extension of ball and beam system. The control target is a plate with 2 mutually perpendicular rotating axes, with the aim of balancing a free rotating ball in a specific position on the plate, or having it rotating in a specific trajectory. The rotation of the plate along X-axis and Y-axis are driven by 2 motors, the vision sensor obtains the position of the ball on the plate and feed back to the control system, certain control strategies are applied to control the board for rotating angles along X-axis and Y-axis by the control system, and thus the balancing position and the motion trajectory of the ball on the plate is achieved.

System Characteristics

1. Position of the ball is detected by visual device.
2. PC+ motion controller open architecture control platform is used
3. DC serve motors are adopted in driving joints
4. 1000-line rotary encoder is used to detect the 2D rotating angles
5. High performance image acquisition card and camera lens
6. System is easy to control, operate and safe to use.



Reference experiments

1. Identification of linear and non-linear models of video recorders
2. System dynamics modeling and analysis
3. Application and research of image processing algorithms
4. 2D servo control based on vision technology
5. Research of PID controller and other classical control methods
6. Research of self-defined control algorithms

Technical Specifications

L × W × H	600mm × 300mm × 400mm
DC motor rated power	24W
Power	AC220V 50HZ 3.2A (AC110V Optional)
DC brush motor deceleration ratio	1:8
Diameter of ball	30mm
Weight of ball	38 ± 2g
Image pixel	768 ± 576
Plate radius	140mm
Sampling frequency	>25fps
Image acquisition card	<ul style="list-style-type: none"> ◆ support the acquisition of NTSC, PAL, RS170 and CCIR standard video source ◆ dual visual decoder structure allows quick switching of channels ◆ can connect to and switch among 16 CVBS channels, 8 Y/C or composite input channels ◆ 16-channel TTL I/O auxiliary interface and RS-485 serial interface ◆ watchdog timer is used to monitor the system integrity ◆ support 32-bit 33/66 MHz PCI bus mode ◆ support Microsoft Windows 2000 and Windows XP OS

Control Examples

- a) Position the ball to the centre of the plate
- b) Position the ball to a specific point on the plate
- c) Movement of the ball to a particular position via a specific trajectory
- d) Travelling of the ball to a certain point under local limitation of rotation in a certain direction
- e) Display of preset posture of the ball at the preset position.

Ordering Guide

Model Number	Name	Product Configuration
GPB2001	Ball & Plate system	<ul style="list-style-type: none"> ◆ Main body ◆ GT-400-SV motion controller ◆ Electric control module ◆ Ball & plate visual module ◆ Ball & plate control software