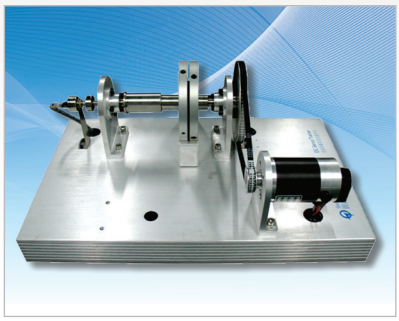
GOOGOLTECH

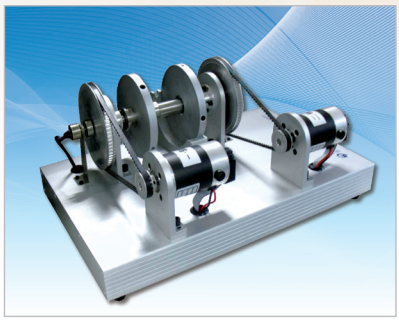
DC SERVO CONTROL EXPERIMENT PLATFORM

Overview

The GSMT series DC servo control experiment platform provides the basic experiment device for elementary control and automation courses in electronic and computer engineering, mechanical engineering. Various experiments such as system identification, modeling of DC servo motor, controller design and controller performance analysis etc. can be performed. With this platform, users can understand the basic principles of PID's influence on system performance index, master the method to adjust the PID current controller, speed controller and position controller parameters of the DC servo motor and comprehend the influence of damping torque and disturbing torque on position and speed control performance, so as to learn the practical skills of the motion control.

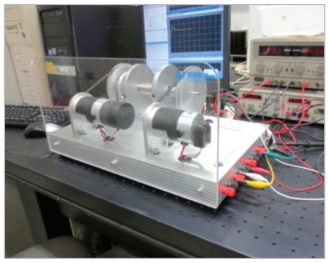


GSMT2012

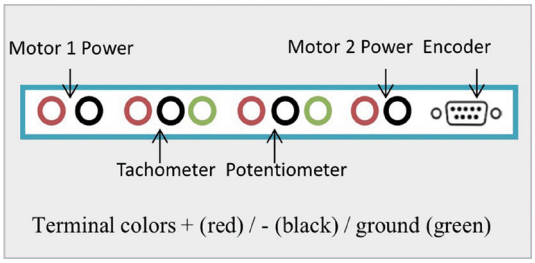


GSMT2014

The series contains GSMT2012, the system of intelligent servo drive-based single motor; and GSMT2014, the system of twin motors based on high-performance motion controller GT-400 developed by Googoltech and the intelligent servo drive, which enables the real time control experiment under MATLAB/Simulink, and covers system modeling and stability analysis, time-domain analysis of second-order system, root locus analysis of third-order system, frequency-response analysis, PID calibration, root locus correction, frequency domain method correction and state feedback. By contrasting different control methods, one can better understand the control theories and learn their applications.



GSMT2004 in HKUST lab



In addition, Googoltech also provides controller free DC servo experiment platform GSMT2004 that allow users to integrate the self-developed controller or third party controllers flexibly. The model GSMT2004 come with sensors of DC servo motor, encoder, speed measuring motor, rectilinear potentiometer.

System Configuration

Name	Description			Remark
(I) Hardware System				
Device Main Body	DC servo motor, encoder, driving belt and inertia disc.			
Electric Box	24V DC Output Intelligent Servo Driver			
Motion Controller	Googoltech Motion Control card			For GSMT2014 only
Analog Control Module	Linear Amplifier			Optional
(II) Control System				
MATLAB	For version up to 2010b – GSMT2014a For 2012b or later – GSMT2014b			For GSMT2014 only
Easy Motion Studio				For GSMT2012 & 2014
Analog Control Module				Optional
(III) Specifications				
Motor	DC	70W	Gear Ratio	±1:4
Encoder	DC	1,000P/R	Potentiometer	Linearity: 1.5%
Gross Weight	<20Kg		Power	AC220V 50HZ 1A
System Weight	<10Kg		L×W×H	450mm×280mm×190mm

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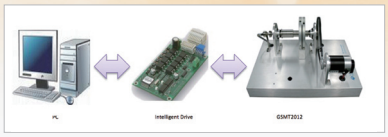
Control modes

(I) Digital Control

The basic model (GSTM2012) uses PC com port to communicate with the intelligent driver and motor with velocity and position.

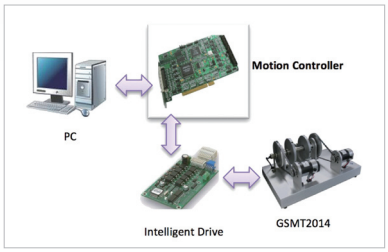


(II) Analog Control

The optional analog control box model GAES1001 directly uses amplifier to control the motor by the analog circuit. User could implement simple PID control.

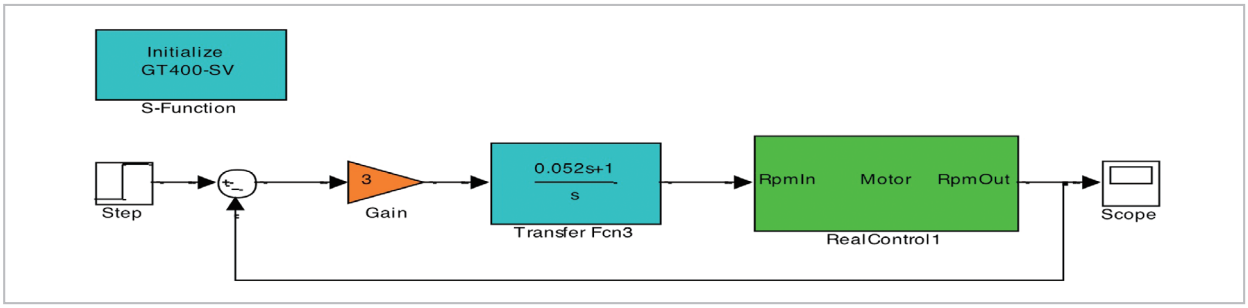
(III) Control under Googoltech motion controller

For model GSTM2014 only, using dedicated PCI motion controller model from Googoltech to achieve real time control in the MatLab environment with high accuracy and degree of linearity.



MatLab Control Interface

Matlab control interface for the second order system root locus correction



System Configuration

Name of experiment	Software platform	Real-time	GSMT2012	GSMT2014
PID current loop, PID speed loop, PID position loop of single motor adjustment	Easy Motion Studio	no	●	●
Various inertia PID current loop, PID speed loop, PID position loop parameter tuning of sing motor	Easy Motion Studio	yes	●	●
Effect of applying disturbing torque on motor speed loop	Easy Motion Studio Matlab	no		●
Effect of applying damping torque on motor position loop	Easy Motion Studio Matlab	no		●
System modeling and stability analysis	Matlab	Yes		●
Second order system time domain analysis	Matlab	Yes		●
Third order system root locus analysis	Matlab	Yes		●
Frequency characteristics analysis	Matlab	Yes		●
PID correction	Matlab	Yes		●
Root locus correction	Matlab	Yes		●
Frequency domain method correction	Matlab	Yes		●
Status feedback	Matlab	Yes		●

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Applicable Curriculum

Content	Satisfied Course Requirements
Automation control theory	Control system modeling, time domain method, root locus method, frequency domain method, state space method analysis and correction
Mechatronics technology	Mechanical system design, sensing, mechatronics control system design, the executing and driving technology of mechatronics system, network control, numerical control system, motion control, etc.
Motion control system	Motion controller, servo motor and drive technology, sensor, motion controller system design, multi-axis coordination control, etc.
Electrical and electronics	Power amplifier, integrated operational amplifier, feedback amplifier, signal generator, operating and processing of signals, etc.
Motor driven and control	DC motor, DC tachometer, DC motor position, speed control, etc.
Others	Robotic control, computer control, etc.

Ordering Guide

Model No.	Name	※ Configuration
GSMT2012	DC Servo Control experiment platform	※ DC servo control system main body (Basic)
		※ Electric Box (Basic)
		※ Easy Motion Studio control software platform
		※ MATLAB control platform
		※ Manual & Experiment guide book
		※ Analog Control Module (Optional)
GSMT2014	Integrated DC servo control experiment platform	※ DC servo control system main body (Integrated)
		※ Electric control box (Integrate)
		※ GT-400-SV motion control card
		※ Easy Motion Studio control software platform
		MATLAB T control platform
		※ Manual & Experiment guide book
		Analog Control Module (Optional)
GSMT2004	DC Servo Control experiment platform (controller free)	※ DC servo control system main body equipped with sensors, encoder, tachometer, rectilinear potentiometer.
		※ Installation manual

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